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ABSTRACT

This document examines reform and development of higher education in France, Poland, and the Netherlands. Part I examines facets of higher education in France including the tasks of the universities: research, teaching, and development of higher training and continuing education; present structures of French universities; increase in student enrollment; degree course structures; decentralization of universities; and higher training and continuing education. Part II reviews higher education in the Netherlands including the purpose of university education; public and private university education; democratization of higher education; higher education and social and economic development; the expansion of higher education and research; and legal provisions concerning autonomy and unity, required educational standards, and internal organization. Part III, higher education in Poland, disucsses procedures and methods of planning, and the future organization of higher education. (MJM)

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No 49

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Reform and development of higher education in Europe

France, The Netherlands and Poland

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Reform and development of higher education in Europe

France, The Netherlands and Poland

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PREFACE

More and more students are seeking places in institutions of higher learning as a result of the demographic increase from 1945 onwards, and of the democratization of higher education. As knowledge grows and the range of subjects widen, new problems, such as the need for diversification and greater specialization, make themselves felt at this level and specifically in certain branches of science and technology. Society has, in addition, its own demands to make on the university, as national prosperity depends more and more on the development and exploitation of human resources. Technical advances, economic development, rapid modification of social structures, the widening spectrum of human culture – all these are reflected in demands made on the university by society and test its resourcefulness and capacity for adaptation.

Reports from France, the Netherlands and Poland figure in the present study and show how the problems and challenges raised by change are being dealt with in different settings. The three reports set out the national objectives of higher education and treat of the factors, methods of approach and planning involved in its long-term development in each country. The views expressed are naturally those of the authors, and do not necessarily reflect the views of Unesco.

Unesco has already published other studies relating to higher education in its Educational Studies and Documents *series. These are entitled:* Formal programmes of international co-operation between universities *(No. 37) 1960;* Higher Education in the USSR *(No. 39) 1962; and* Higher Education in the U.S.A. *(No. 47) 1963. It is felt that studies such as these will assist in the development of a comparative appraisal of higher education problems. Finally, it should be noted that the fourth volume of the* World Survey of Education, *which deals with the higher education field, will be issued in 1964-65.*

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PART ONE

HIGHER EDUCATION IN FRANCE

by
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CHAPTER ONE

TASKS OF THE UNIVERSITIES

The responsibilities of French higher education, as defined in a recent official text (Decree of 6 January 1959 on Education Reform) are as follows:

"Public higher education is responsible for:

1. contributing to the advancement of science, the training of research workers and the development of research in science, letters and technology";

2. "dispensing higher scientific, literary and artistic culture";

3. "training recruits for professions requiring broad culture as well as detailed knowledge. (In particular, higher education contributes to the training of teachers by providing for their scientific instruction and participating in their pedagogic instruction)";

4. " to take part, at the highest level, in cultural education and professional upgrading".

"Its structure and programmes must be constantly adjusted to the exigencies of scientific progress and the needs of the nation".

Thus three essential and indivisible purposes emerge at the higher education level:

research,
teaching, and
upgrading.

Special attention is drawn to the leading place allotted to research and to the expressed intention that university activities be constantly adapted to the economic and social needs of the nation and to the advancement of knowledge.

RESEARCH AT THE UNIVERSITIES

University staffs should normally devote a very considerable part of their time to research work.

This characteristic responds to the necessity of maintaining the teaching of the various subjects at a high scientific level, each teacher remaining directly associated, throughout his working life, with the advancement of the discipline he teaches.

The universities have complete freedom in the matter of research. With their numbers, they constitute a huge area of unrestricted research where ideas can flourish and projects develop without any sense of pressure or concern to immediate returns.

The very diversity of university studies is conducive to the most varied and fruitful associations between researchers belonging to different disciplines. Another feature of university research, besides its complete freedom, is its universality.

University research projects can relate both to applied and to pure science. The universities do indeed fill the essential rôle in basic research, but they also have increasingly important commitments in applied research, and it is in their laboratories that the majority of young researchers for industry get their training alongside those who will remain in education.

There has been a notable expansion of research at French universities during the past few years.

A key circumstance is the appreciable enlargement of the professorial body, necessitated conjointly by the rise in the number of students and by the need to improve the student-teacher ratio. The numbers of professors, Maîtres de Conférences, (lecturers) and assistants almost doubled between 1956 and 1961 in the human sciences (Arts and Law), and between 1957 and 1961 in the natural sciences.

This large increase in university directional and supervisory potential for research teams has been naturally conducive to an increase in the number of young researchers. Column 3 in Tables 6 and 6 bis shows the evolution of the numbers of students pursuing post-graduate arts and science studies in faculties over the period 1948-1961. It will be noted that, in the scientific disciplines, the expansion has been continuous and has become more strongly marked since 1956 to a degree which will double the number of young researchers in ten years. In the arts disciplines, after a slackening between 1957 and 1959, a considerable expansion is again in evidence.

Other factors contributing to the recent expansion of university research and to the increase in the numbers of young researchers in university laboratories have been the provision of more scholarships at this level of higher education, the introduction, initially in the science faculties (Decree of 20 July 1954), and subsequently in the faculties of arts and human sciences (Decree of 19 April 1958), of the "3ème Cycle d'Enseignement" designed to "give students a thorough knowledge of a speciality and an initiation into research", and the concerting of efforts by higher educational establishments and the Centre National de la Recherche Scientifique.

TEACHING

The current changes in the French universities are based on three groups of considerations:

1. Demographic considerations

The French universities will have to cope in the near future with the effects of an unprecedented rise in population.

Table 1, attached, shows the evolution of the number of births from 1935 to 1961, and the estimated figures down to 1975.

Table 2 and Graph 2 bis show the evolution and distribution year by year, from 1953-1954 to 1960-1961, and from 1960-1961 to 1970, of the numbers of young people in the 18-24 age group, i.e. population group from which the bulk of university students are recruited (nearly 80% of students are in fact in that age group).

The fall in the number of births during the Second World War produced a corresponding fall in the numbers of young people in the 18-24 age group from 4,432,400 in 1953-1954 to 3,902,700 at the date of writing, with the prospect of a further slight shrinkage to approximately 3,890,800 in 1962-1963.

Thus the section of the population on which higher education draws goes on falling until 1963-1964, and from then on there will be a considerable recovery in its numbers, which will exceed 5,650,000 in 1971. This circumstance alone would produce an annual increase of about 5-6% in number of students during the six years following 1965 even if the rate of enrolment in all types of secondary education remained stationary.

2. Considerations arising from the marked increase in the rate of enrolment in secondary level education and in higher education itself

During the past few years, the numbers of pupils enrolled in all types of secondary education have increased considerably as a result not only of the demographic factors discussed above but also of the social trend which is increasingly leading families to commit their children to extended courses of study.

Table 3 shows the rise in the numbers of pupils attending public or private secondary establishments between 1951-1952 and 1961-1962.

A direct consequence of this expansion in secondary education is an increase in the number of pupils passing the baccalauréat examination, which concludes secondary education and opens the way to higher education, as its first step.

Table 4 shows the growth in the numbers of bacheliers from 1948 to 1961, and the estimated growth down to 1970, as worked out during the preparatory studies for the Fourth Plan for School and University Equipment (1962-1965). It will be observed that the number of bacheliers approximately doubled over a ten-year period, and that by 1970 the present figure would have increased by about 2.1/2 times.

Concurrently, the number of university students has risen considerably over the past fifteen years, going from 120,000 in 1945 to 130,000 in 1950 and 215,000 in 1961. The last column of Table 5 and Graph 5 bis show the formal pattern of this expansion in numbers, which, significantly, is entirely due to a rise in the rate of enrolment, most of the young people now taking higher education having been born during a period of regression in the French birth rate corresponding to the period of the Second World War. Thus the figures in Table 5 show that for the last few years the steady annual increases of 5-10% in the numbers of university students, with an increase of 7% over the final four-year period, are solely due to increased enrolment.

3. Need to provide an extensive range of employment outlets

But there can be no disguising that at a time when the number of students is about to rise very considerably, the ample openings available for some years past in the teaching profession cannot possibly increase or even remain at the same level indefinitely; the impact of the population upsurge on secondary education is making for large-scale recruitment, resulting in an appreciable reduction in the general age level among teachers. Hence the posts filled today will not fall vacant for a long time to come, and the creation of new posts will be on a smaller scale once the effects of the population increase on secondary schools has ceased and the only operating factor will be the increase - on a necessarily diminishing scale - in the rate of enrolment.

Moreover, there is no doubt but that, in the next few years even in the liberal professions, new openings will be few and far between, and the bulk of the students reaching the universities will, therefore, have to turn to other careers.

In addition to their traditional task of creating a highly cultured élite, with as many members as possible, the universities are also called upon, more than ever before, to train new middle and upper level scientific, technical and administrative staff. Their essential task, therefore, is to provide all students with training for careers, and to adapt themselves accordingly to the need for providing a wide variety of training courses to meet the requirements of the main professions.

DEVELOPMENT OF HIGHER TRAINING AND CONTINUING EDUCATION

Numbers of technicians who have had no opportunity of extended education prove, on the job, to be fitted for more responsible posts. The universities must be opened to them for the supplementary scientific or technical training of which they stand in need. Universities have, in short, an increasing part to play in social advancement.

Again, science and technology are evolving so rapidly that frequent refreshing of individual

knowledge in each case is becoming a general necessity. The universities must offer wide facilities for "reprocessing" acquired knowledge, while facilitating the retraining of technicians where necessary.

CHAPTER II

PRESENT STRUCTURE OF FRENCH UNIVERSITIES

In principle, French universities are groups of establishments of public higher education existing within a given territorial division known as an Académie.

Each university is headed by a Rector, who is Chairman of the University Council and carries out its decisions. The Council consists of representatives of the establishments of higher education and of the local communities served.

The award of the successive university degrees - baccalauréat, licence and doctorat in particular - is the exclusive prerogative of the faculties. The latter, though coming under the university, have corporate status, legally and financially, and thus enjoy a very great degree of autonomy. A faculty is administered by a Dean elected by the members, and he is Chairman of the Faculty Council, which comprises all the full professors and is the faculty's Board of Administration. The Dean is also Chairman of the Faculty Assembly, which is more or less the board in charge of the organization and improvement of studies and consists of full professors, Maîtres de Conférences or Agrégés, and Readers with Doctors' Degrees.

In France, the various disciplines are grouped into five faculties: Law and Economics, Medicine, Pharmacology, Science, Arts and Human Sciences. Not all universities have all five. Some of them lack one or more; in others, Medicine and Pharmacology are merged into a combined faculty, and in some cases one of the branches of learning is provided for by a school, college or institute which is attached for the purposes of its subject to a faculty coming under another university.

The following table shows the geographical distribution of degree-course establishments in France.

Thus there are other establishments - schools, colleges or institutes and centres - functioning alongside the faculties and under their supervision, and so enabling study facilities to be "spread" geographically.

Apart from the public establishments, there are municipal or private faculties, schools and centres whose students are examined by the State faculties.

It was 1920 which saw the start of the systematic proliferation of faculty or university institutes, as teaching or research establishments with a measure of autonomy and their own administrative councils in which distinguished non-members of the university could be included. Some of them are intended solely to "spread" facilities for traditional-type studies, and are called colleges in the case of science or arts and human sciences, schools in the case of medicine and pharmacology, and institutes in the case of law and economics, but the difference is merely a terminological one.

In other institutes, the aim is to provide various types of specialist education, so as to permit the conferring of diplomas of their own, distinct from the usual university degrees, e.g. diplomas in engineering, while some of them either concentrate entirely on specialized forms of research or combine specialized research and instruction.

Finally, there are cases where institutes are the medium enabling two or more faculties to combine forces for special types of research or teaching. In such cases the institute is attached directly to the university; particular examples are the Instituts d'Etats politiques (institutes of political studies) or Instituts de Préparation aux Affaires (business training institutes) in which faculties of law and economics and faculties of arts and human sciences co-operate.

At present, the French universities between them incorporate 484 university or faculty institutes, including 41 schools of engineering, 7 institutes of political studies, 13 institutes of business training or management, 98 institutes of medical or pharmaceutical science, 116 institutes of arts and human sciences and 115 scientific institutes (Table 7).

The autonomy enjoyed by the institutes gives their teaching a notable degree of flexibility. In particular, they have very wide latitude in the choice of their teaching staff. Practising members of professions have long been able, for example, to co-operate with university teachers in providing specialized training for students.

Incidentally, the creation of university institutes enabling several faculties to co-operate within a single organism has been an extremely important factor in reducing the isolation which might have developed between different faculties within the same university.

Table of establishments of public higher education providing degree courses

Academy	University	Location of constituent establishments	Nature of establishment				
			Law and Economics	Medecine	Pharmacology	Science	Arts and Human Sciences
Paris	Paris	Paris	Faculty	Faculty	Faculty	Faculty	Faculty
Aix	Aix	Aix	Faculty	-	-	-	Faculty
		Marseille	-	Combined Faculty		Faculty	-
		Nice	Institute	-	-	Faculty*	College
Besançon	Besançon	Besançon	-	Combined School		Faculty	Faculty
Bordeaux	Bordeaux	Bordeaux	Faculty	Combined Faculty		Faculty	Faculty
		Pau	Institute	-	-	College	College
Caen	Caen	Caen	Faculty	Combined School		Faculty	Faculty
		Rouen	Institute	Combined School		College	College
		Le Mans	-	-	-	College	-
Clermont	Clermont	Clermont	Faculty	Combined Faculty		Faculty	Faculty
Dijon	Dijon	Dijon	Faculty	Combined School		Faculty	Faculty
Grenoble	Grenoble	Grenoble	Faculty	Combined Faculty		Faculty	Faculty
		Chambéry	-	-	-	College	Institute
Lille	Lille	Lille	Faculty	Combined Faculty		Faculty	Faculty
		Amiens	-	Combined School		College	-
Lyon	Lyon	Lyon	Faculty	Combined Faculty		Faculty	Faculty
		St-Etienne	-	-	-	College	-
Montpellier	Montpellier	Montpellier	Faculty	Faculty	Faculty	Faculty	Faculty
		Perpignan	-	-	-	College	Institute
Nancy	Nancy	Nancy	Faculty	Faculty	Faculty	Faculty	Faculty
Nantes	Nantes	Nantes	School	Combined Faculty		Faculty	College
		Angers	-	Combined School		College	-
Orléans	-	Orléans	-	-	-	College	-
		Tours	-	Combined Faculty		College	College
Poitiers	Poitiers	Poitiers	Faculty	Combined School		Faculty	Faculty
		Limoges	-	Combined School		College	-
Reims	-	Reims	-	Combined School		Faculty	-
Rennes	Rennes	Rennes	Faculty	Combined Faculty		Faculty	Faculty
		Brest	-	-	-	College	College
Strasbourg	Strasbourg	Strasbourg	Faculty	Faculty	Faculty	Faculty	Faculty
		Metz	-	-	-	College	Centre
		Mulhouse	-	-	-	College	-
Toulouse	Toulouse	Toulouse	Faculty	Combined Faculty		Faculty	Faculty

**Faculty in process of formation*

CHAPTER III

INCREASE IN STUDENT ENROLMENT

As already noted, the continuous rise in student enrolment will proceed at a more rapid rate, particularly from 1964 onwards, through the combined effect of the increase in school enrolment and the population bulge.

The general figures for variations in enrolment for each French university and for all universities combined in the period 1948-1961 are given in Table 5, and in the annexed Graphs 5 bis, 5 (III), and 5 (IV). Between 1948 and 1961 the total figure for all universities rose by about 73%.

The estimates arrived at by the Commission de l'Equipement Scolaire et Universitaire in drafting the fourth equipment plan show the anticipated expansion for the next few years (see Table 8 ter). Total enrolment will exceed 500,000 in 1970, representing a more than twofold increase over a period of ten years.

The distribution of students between the various categories of studies between 1948 and 1961 is given in Table 8 and plotted in Graph 8 bis.

During this period, variations in enrolment in law and economics faculties and medicine and pharmacology faculties were relatively slight. In the case of law, there was even a fairly marked drop, coincident with the extension of the licence course from three to four years (decided on in 1954).

In science faculties and in faculties of arts and human sciences, on the other hand, the past ten years have witnessed a very considerable increase in enrolment, especially (since 1955) in the former, consequent on the new urge to go in for science and technology.

The Equipment Commission reckoned that, taking overall employment prospects into account, the present student distribution between types of faculty is likely to shift, in the period down to 1970, towards an even more marked increase in enrolment in the scientific disciplines, and Graph 9, plotted from the estimates of bacheliers qualified, thus gives us a prospective student distribution of two-fifths for science, another two-fifths for arts, law, business or economics, and one-fifth for medicine and pharmacology.

The inference from these estimates is that faculties of science and faculties of medicine and pharmacology must be prepared for a doubling of enrolment during the seven-year period from 1963 to 1970, with a slightly lower proportionate expansion (90%) in faculties of arts and of law.

These figures demonstrate the tremendous efforts that will have to be made by the French universities before 1970 in respect of building, equipment, staff recruitment and adaptation to meet the needs of student placement.

Special mention should be made of engineering training at universities. As far back as 1947, a stimulus was given to engineering studies by promoting certain institutes to the status of Ecoles Nationales Supérieures d'Ingénieurs (ENSI) (National Engineering Colleges) followed by the establishment of additional institutes or colleges. Of the 51 engineering schools attached to the universities, 20 now rank as engineering colleges. Their numbers will in due course be increased by the Instituts nationaux des Sciences appliquées (INSA) (National Institution of Applied Sciences), the first of which has been in operation at Lyon since 1958, in close liaison with the university, while three others are under construction or projected, at Toulouse, Rennes and Lille.

Taking all universities and the Lyon Institute together, the number of engineering students totalled 5,245 in 1961, while the number of engineers graduating from them in that year was 1,560.

It should be pointed out that in France there are several categories of establishment training engineers - the engineering schools coming under technical ministries other than the Ministry of Education, private engineering schools, and schools of engineering coming under the Ministry of National Education, including those attached to the former Direction de l'Enseignement Technique and those run by the Direction de l'Enseignement Supérieur. In 1961 the latter group trained about 25% of the total number of engineers graduating (1,560 out of 6,263).

The Equipment Commission's estimate was that by 1970 the schools under the Direction de l'Enseignement Supérieur would be responsible for the training of 5,500 engineers (or about 4,000 more than in 1961), representing nearly half the number of graduate engineers who will be produced in France at that date.

Here again, the vastness of the task of preparation which the universities must tackle is evident.

One point to be noted is that growth is very uneven between one university and another. This is because the population factors and particularly the growth of secondary school attendance are variable between regions.

Table 5 shows the disparity in numerical growth rate between the universities over the period 1949-1961. The most rapid rates are

essentially reflections of successful regional drives for secondary school enrolment.

This growth pattern suggests that towards 1970 a state of relative equilibrium in this respect will develop, marked by a progressive approximation of the academies with the lowest rates now to those where they are now highest.

Hence university expansion will remain uneven during the next few years and may be specially great in those academies where expansion has been smallest hitherto.

Graph no. 10 shows the Equipment Commission estimate for academies other than the Paris Academy. The University of Paris alone will have an enrolment of about 150,000 in 1970 (Graph no. 11).

As the Equipment Commission puts it, never at any time in their history will the French universities have experienced such changes.

CHAPTER IV

DEGREE COURSE STRUCTURES

LENGTH OF COURSES

The rapid advance of knowledge is leading, in all countries, to increases in the length of studies for the traditional degrees.

This has happened in France, too, either formally (the length of the course of the licence in law, for instance, was extended from three to four years in 1954, and there have also been increases in many engineering schools) or in practice, as a result of a kind of almost unavoidable expansion of the teaching programmes; thus, the majority of students take at least four years to get the arts or sciences licence, whereas formerly most people qualified in three. There is nothing abnormal in this development, and it is even an undeniable necessity for the attainment of a standard of culture or specialization which is high in terms of modern knowledge.

However, the development of secondary education opens higher education to a much larger percentage of young people than formerly, and though all are anxious to have university training, a good proportion aim at entering employment without spending more than two or three years on post-baccalauréat studies. With higher education becoming increasingly mass education, we can no longer simply content ourselves with turning out the most finished scholars possible, without regard to the time it takes.

"Steps" must be introduced within the successive degrees of higher education; and it has also become necessary to start new diplomas for shorter courses of study, whether of new types or not, for those who want or have to take up employment earlier. To the extent that these shorter courses are stages in a fuller course of higher education, they preserve the students' full chances of further advancement. This will provide answers to the problem of the organization, and more particularly the length, of higher education in line with present conditions.

ORIENTATION AND READJUSTMENT OF STUDIES

The considerable growth in the proportion of young people taking up university studies logically implies a review and readjustment of those studies with a view to the more effective placement of students in the various branches of natural activity.

While it is true that, for many years past, students leaving the university have not turned solely to teaching and the liberal professions, the problems of providing them with outlets and of training them for employment undoubtedly calls for new arrangements.

If necessary, evidence could be drawn from the Equipment Commission's work on the Fourth Plan to show the disparity that will exist from 1964 onwards between the openings offered in teaching and foreseeable licence graduations. Graphs nos. 12 and 13 show the estimated concurrent increase in licence graduations and openings in science and arts teaching.

It clearly emerges that while France, like all other countries, at present has a serious shortage of prospective teachers at licence level, this situation will tend to be reversed towards 1965 in the science disciplines and towards 1967 in the arts disciplines. At that stage, extensive openings outside the teaching sector will be absolutely necessary.

It is in view of these prospects that the programmes and the very nature of the degree courses given at French universities have undergone appreciable modification in certain particulars, more especially by the introduction of specialist licences with a technological bias, planned on a two-step basis with an intermediate diploma.

It was with the same considerations in mind that it was made permissible for the new licences to cover instruction which might in some cases be given in different faculties which together constitute a training accepted as satisfactory for the pursuit of certain professions.

All these new arrangements are designed not only to facilitute, at the various university leaving levels, the guidance and training of students for employment, but also to make it possible for the universities, thanks to the range of courses available, to meet the multifarious requirements indicated by the major professions as regards the training of their senior staff. It must not be forgotten that in this matter, the accelerated rate at which technology and the economy are working may make swiftness of adaptation by the university essential. Extremely abrupt shifts may occur in fact, in the quantitative and qualitative demand for graduate level staff.

Table 14 attached shows in summary synoptic form the system of studies in individual faculties.

FACULTIES OF LAW AND ECONOMIC SCIENCES

The teaching in faculties of law and economics has undergone extensive reform, culminating chronologically in the institution, in 1959, of a licence in economics, and the adoption, in 1962, of a new structure for the licence in law which is, in fact, a modification of the structure established earlier by a reform of 1954.

One characteristic of law and economics studies is that they take four years, representing an extension as compared to the pre-1954 licence, with its three-year course. Another feature is the institution of separate degree courses for law and economics sciences. This is obviously justified by the development of the latter and the demands of specialization, but the two courses have been designed with a number of subjects taken together by candidates for either licence, with facilities for transfer either way: in particular, the first year studies is more or less the same for both.

The lengthening of the course for the law licence, dictated by the need for adequate modern training, has to some degree been offset by a revision of the syllabuses for the first two years, leading to the diplôme d'études juridiques générales (formerly called the baccalauréat en droit), which can thus serve as the final degree for placement in certain positions.

In the third year the curriculum already permits of initial specialization through the possibility of choice of subjects offered to the student.

The fourth and final year, with the material subdivided into certificat courses, is the real year for specialization. Provision is made for a wide range of options, and qualifications awarded by specialist establishments - Instituts d'Etudes Politiques, d'Etudes Juridiques, de Préparation aux Affaires, etc. - or by faculties of other categories than law and economics are acceptable as equivalents in the case of certain certificates.

Thus 1962 saw the completion of a study structure well adapted to the exigencies both of higher cultural education and of training at two levels for a wide range of posts.

The recent reforms involved no changes in the structure of the doctorates granted by faculties of law and economics. For all three - doctorates in law, political science and economics - the requirement is successful training in individual work after the post-graduate specialist instruction provided by the courses for two advanced study diplomas.

Also unchanged is the structure of the course for the capacité en droit certificate. This examination, restricted to young people needing to embark on legal studies without having first taken the baccalauréat, is in itself a good instrument of social upgrading. Since 1961, incidentally, facilities have been granted to holders of this certificate for admission to the licence course.

FACULTIES OF MEDICINE AND PHARMACOLOGY

The special purposes of the faculties of medicine and pharmacology, involving both first-rate basic science teaching and training for difficult professions, gives them a structure possessing features not shared by other faculties.

Medicine

Medical studies have been in process of reform since 1961.

The minimum length of the course for the degree of Doctor of Medicine has been reduced from 7 to 6 years, though this naturally does not stop plenty of students from continuing voluntarily beyond the minimum period in order to perfect their knowledge or to specialize.

The prime object of the reform is to create single entities, known as Centres hospitaliers universitaires (CHU), incorporating the former faculties where students got their scientific and theoretical instruction and the hospitals where they were given clinical training.

The aim of the promoters of the reform was to make the CHU an establishment where medical education and medical research can both flourish round a full-time teaching staff freed from the worries of private practice and readily organizable into teaching and research teams in which there will be constant and natural co-operation between the clinical and the basic sciences. It amounts to the general application of a system which has proved its worth in certain French universities where it already existed in effect as well as in many foreign universities. In point of fact, the reform is only just beginning to be implemented, and its future depends on a vast recruiting drive for instructors and the execution of extensive building operations for which the plans are well advanced.

The actual pattern of the six-year medical course is as follows:

The first year is devoted to general science studies, comprising physics, chemistry and biology. In the second and third years, science studies are continued while concurrently with an introduction to symptomatology in the wards the three final years are used almost entirely for medical training proper allied to the basic scientific disciplines.

The scientific foundation required during the first three years is considerable, and it would be reasonable, in the near future, to allow it to carry with it the regular possibility of transfer to faculties of science, say at the level of the Diplôme d'études scientifiques générales (general science diploma).

The full six-year course, leading to the Doctorat d'Etat de Medicine (State Doctorate of Medicine) opens the way to further intramural study for the Certificats d'études spéciales, i.e. to specialization and research.

Pharmacology

Students completing their pharmacology studies are now turning to a fairly wide variety of careers ranging from dispensary work to biological or chemical research or industrial chemistry.

For some years past, it had been felt that pharmacology studies needed reviewing, and this was done in 1962. As a result of the decisions then taken, they will shortly be recast to fit the diversity of the ends they serve.

The length of the course will be kept at five years, but the first year - formerly devoted to dispensary training - will henceforward be one of general science education of equivalent level to the course for the preliminary certificate (SPCN) of the science licence, the training periods to be spread over all five years of the course.

The second and third years will provide a basic science education and an introduction to pharmacology; and for their fourth year all students will take a common pharmacology course.

In the fifth year, specialization will be catered for by the provision of a wide range of options, with subjects split up into "Certificate" courses, and may also be facilitated by extending equivalence to certificates awarded in other faculties or in institutes. Thus the pharmacology student, like the law student, is to get background education during the initial years of his course, with extensive possibilities during the final year, facilitated by the channels opened up between the different faculties, for adapting his studies to a variety of employment openings.

Another point to note is the convergence effected with science faculties by agreeing the equivalence of first year pharmacology and the science faculties' SPCN certificate. It may be added, in the same context, that the basic science inculcation in the first three years of pharmacology is adequate to afford possibilities, in the near future, of transfer to science faculties at the level of the Diplôme d'études scientifiques générales.

The recent reform has not changed the conditions of qualification for research or advanced specialization via the doctorate or the courses for Certificats d'études spéciales subsequent to the amended traditional courses.

FACULTIES OF SCIENCE AND FACULTIES OF ARTS AND HUMAN SCIENCES

It is in the faculties of science and the faculties of arts and human sciences that the impending influx of students is likely to be heaviest.

Traditionally, these faculties were for producing professors and researchers, and it was the culture acquired in reading for the traditional licences which enabled a fair number of students to turn successfully to professions other than teaching or basic research.

Of course, the engineering schools attached to the faculties of science, and a number of specialized institutions also have long been providing training for certain careers in industry, but the numbers of bacheliers who will be entering higher educational establishments from now on involves a far more extensive effort of guidance and training at different levels for a variety of careers matching the needs of the economy.

Hence the introduction in the science faculties, in 1961, of the Licence ès-Sciences appliquées and Diplôme d'études supérieures techniques (DEST), and in 1962 of the Diplôme d'études scientifiques générales (DESG), as new stages in the regular Licences ès-Sciences, matching the Diplôme d'études littéraires pratiques (DESLP), introduced concurrently, in faculties of arts and human sciences, as a stage in certain specialist licences.

Faculties of Science

(a) Diplôme d'études scientifiques générales (DESG) and normal Licences ès-Sciences

The DESG was introduced in order to meet the need for a step in the full licence course for work on doctor's degrees at which some students can branch off into employment in possession of a diploma of a standard which is clearly defined, especially against the background of the certificates of higher studies which are accepted as credits for these diplomas and strictly relate to the basic subjects, such as general mechanics, electricity, optics, general geology, botany, zoology, etc., to say nothing of all the other different certificates which can count towards the licence proper.

Thus the attractions of the DESG should serve to encourage students, without prejudice to the free choice of subjects in faculty studies for the licence, to proceed with their studies in rational sequence.

(b) Diplôme d'études supérieurs techniques (DEST) and Licences ès-Sciences appliquées

The institution of the DEST and the corresponding licences in applied science is also recent, dating only from 1961, and the innovation is therefore still in the experimental stage.

The aim in view is to make direct provision for openings for students by guiding and initiating them into particular occupations, while at the same time giving them a science education comparable to what they could get through the normal licence approach.

Here, again, the training provided is at two levels, and licence in applied science includes the subjects taken for the corresponding DEST.

In view of the introduction of the DEST, the requirements for the preparatory certificate for the licence have been made more flexible to allow

candidates, if they wish, to devote more attention to subjects of their own choice. While retaining the principle of a basic general science education, the view has been taken that it is only reasonable, in the case of numbers of students aiming at technological careers, to allow some measure of specialization from the start which cannot but help to keep standards high in the selected specialist fields.

Streaming and initiation in the technological range is effected through the medium of the creation by science faculties of Certificats de Technologie covering syllabuses which have to be agreed on with the professions concerned. For the DEST, students must take the Certificat de Technologie plus a specified Certificat d'études supérieurs selected from the basic certificates for the licence.

After qualification, the DEST is actually awarded only after a year in the profession concerned.

Innovations rarely meet with immediate understanding, and invidious comparisons have occasionally been made from the standpoint of the services they can render of the respective skills of DEST-holders and the techniciens supérieurs (senior technicians) produced by the regular technical education process. Actually, the two are different kinds of engineer's assistant: both are equally essential, and in fact complementary. The senior technician has a good secondary education and a very thorough training in workshop practice - he is specifically trained for supervisory duties. The DEST-holder has had a more thorough basic scientific training and on that account is equipped to give the engineer direct assistance in planning and execution. Undoubtedly, too, practical experience is bound to even out the differences between the senior technician and the DEST-holder as time goes on, with the former acquiring more background knowledge and the latter, improving his grasp of technical practice through day-to-day activity. Incidentally, experience shows that a good general education by appreciably increasing the power of understanding, makes it possible to acquire technical knowledge very rapidly.

The Licence ès-Sciences appliquées can be obtained by taking four further Certificats d'études supérieurs in addition to those for the corresponding DEST. The choice of these certificates, some of which are wholely related to science, while others are highly technological in nature, is determined by agreement between the faculty and the professions concerned. In this way, the universities adjust to the needs indicated by their students' prospective employers.

The division of science studies into certificate courses, each covering one year's study, opens up wide possibilities of adaptation and conversion, which are still further enhanced by the fact that two of the four science certificates required can be replaced by certificates from other faculties.

(c) Doctorates in science

Traditionally, training for research and reading for a doctorate go hand-in-hand.

The conventional doctorates obtainable in the universities, the Doctorat ès-Sciences d'Etat and the Doctorat d'Université, were supplemented in 1954 by a Doctorat de 3ème Cycle, less ambitious than the Doctorat d'Etat but enabling larger numbers of research recruits to be given an initial grounding and efficiently directed to individual specialist work.

The diploma of Ingénieur-Docteur, created as far back as 1925, was intended to promote training for applied research. In 1961 a Doctorat ès-Sciences appliquées at the level of the Doctorat ès-Sciences d'Etat was introduced primarily for the benefit of applied science licentiates. Thus university degrees at all levels are now obtainable for applied science.

ARTS AND HUMAN SCIENCE FACULTIES

(a) Licences ès-Lettres

The Licences ès-Lettres, designed for prospective educators and obtainable by taking a Certificat d'études littéraires générales, supplemented by four Certificats d'études supérieurs, have not undergone any recent modifications in structure. It is, however, worth noting that the importance assumed by certain disciplines such as psychology or sociology has prompted the institution of specialist licences in them.

The Licence de Psychologie, instituted in 1947, provided the first example of co-operation between arts and human science faculties and other science faculties within the framework of a single degree course by incorporating the latter's Certificats de Psychophysiologie. Meanwhile, the Licence de Sociologie involves collaboration of the same kind with law and economics faculties by incorporating their Certificat d'Economie, Politique et Sociale.

Thus a beginning has been made in opening a corridor between the arts and human sciences faculties and the other faculties within the actual context of the traditional types of degree course.

(b) Diplômes d'études littéraires pratiques and Specialized Licences Diplômes d'études littéraires pratique (DELP) were introduced in 1962. While providing the essential background education, they ground students in techniques which will open employment prospects outside the traditional spheres of teaching and research. The DELP is thus the counterpart, in arts and human sciences faculties, of the DEST in science faculties. Like the latter, it is obtainable by taking a certificate for preparatory studies, followed by a basic certificate for advanced literary studies, together with a certificate for a clear-cut

technical speciality (in documentation, secretarial work or journalism, for example).

The corresponding specialized licences are obtainable on the basis of two additional certificates for advanced studies, the nature of which will depend on the needs of the profession for which the student is training. It should be noted that here, again, one of these two certificates may, if necessary, be obtained in a faculty other than one of arts and human sciences.

The idea governing the composition of the licence is the same as in the case of the Licence ès-Sciences appliquées.

(c) Doctorates in arts

As in the science faculties, the traditional State and university doctorates have recently (1958) been supplemented by a Doctorat de 3ème Cycle which has appreciably enlarged the possibilities of specialization and a thorough grounding in individual research work.

SCHOOLS OF ENGINEERING

The vast demand for engineers which is a characteristic feature of all industrial countries is resulting in a considerable expansion in recruitment, on the basis of competitive examination, at the schools coming within the orbit of the universities; of late years, however, it has been considered advisable to broaden entry to these schools by recruitment on the basis of qualifications, particularly of candidates from industry etc. who have worked their way up.

Recruitment on the basis of qualifications does not mean that selection is not severe; it is the normal procedure for the Instituts nationaux des Sciences appliquées, the first of which was established in Lyon in 1958.

CHAPTER V

DECENTRALIZATION OF UNIVERSITIES

The data in Table 5, and Graphs 5 (III) and 5 (IV), show that the enrolment at the various French universities is extremely uneven at the present time, and that prospects of expansion during the next four years vary within very wide limits.

Particularly noteworthy is the huge concentration of students at the University of Paris, where there are already nearly 80,000, and the fact that eight other universities already have over 10,000 students each.

In each of these bigger universities, the actual faculties would be stricken with hypertrophy and become hardly manageable were it not for the systematic expenditure of considerable effort of internal organization and decentralization by the establishment of more or less autonomous annexes and new establishments.

The dispersal of the French university system has been pursued by a variety of means:

(1) Immediate or gradual formation of new universities within the territorial framework of new academies formed by reducing the areas of the most populous ones;

(2) Decentralization of existing universities by opening new establishments (colleges, institutes, schools) in densely populated areas previously unprovided with higher education facilities, thereby cutting down the expansion of the existing establishments while increasing the proportion of young people able to pursue their studies without leaving the family environment.

In practice, the establishments thus created are intended to accommodate students beginning their higher education. It is at this level of studies that the maintenance of contact with the family environment is most valuable, and also that the premises and equipment required are least elaborate and can most readily be standardized, thus making the operation less costly and enabling it to be expedited.

The new establishments would be in no position to provide genuine higher education but for the fact that their staffs, as in the faculties, have the dual task of conducting research and teaching, which means that they have to be equipped not only with teaching facilities, lecture rooms, classrooms, etc. - but also with the laboratories and libraries essential for the teaching staffs' individual work.

Nevertheless, this provision of reasonable facilities for basic research is secondary to the necessary concentration of the extremely costly tools for highly specialized research, which remain in the major establishments, the latter themselves finding it desirable, at this level, to concert activities so as to avoid duplicating such costly special equipment. Where necessary, of course, the staff of the new satellite establishments, has access to the main establishment's capital equipment.

These were the circumstances in which two academies, planned to become the seat of universities at a later date, were started at Reims and Orleans in 1961 as a step towards decentralizing the University of Paris. Simultaneously, a further academy was brought into being at Nantes, where there were already great teaching establishments worthy of promotion into faculties, and this town has already become the seat of a new university.

Since 1958, four new science faculties have been opened at Nantes, Nice, Orsay and Reims, as well as three combined faculties of medicine and pharmacology at Clermont-Ferrand, Nantes and Reims.

At the present moment, four major institutes or schools are in process of becoming faculties: the schools of medicine and pharmacology at Grenoble and Tours, the Nice Law Institute and the Rouen Science College. This metamorphosis, however, is the culmination of a very long period of installation and gradual development.

Actually, the decentralization of French universities is based essentially on the opening of arts and science colleges, for it is in the arts and science disciplines that the flood of students occurs.

The past four years has thus seen the establishment of 14 science colleges and 7 arts colleges; and the investigations carried out enable the installation of new colleges in other centres to be planned in an order of priority determined by the local output of bacheliers. The practice followed is to establish the science college first and arts college only some years later so as not to sidetrack students with a bent for science or technology.

Thus the opening of all colleges is based on a plan conceived in terms of the demographic situation and in accordance with the figures for anticipated enrolment, and their natural effect should be to ease the strain on all the large faculties.

Most of the colleges have to confine themselves to the preparatory courses, though some do provide courses towards the licence. It can be reckoned, however, that if they go beyond the preparatory year, their activity will normally be

confined to catering for the short-cycle diplomas created ad hoc (DESG, DEST, DELP).

Altogether, over the past few years, the number of university science establishments has nearly doubled and the number of arts establishments increased by about fifty per cent.

CHAPTER VI

HIGHER TRAINING AND CONTINUING EDUCATION

HIGHER TRAINING

Apart from a few courses of study which led, not to proper university degrees but to special diplomas such as the Capacité en droit or certain specialist diplomas, the universities long remained almost completely closed to non-bacheliers, i.e. all who had not been in a position to continue secondary education to its normal conclusion.

Since 1950, particularly, considerable efforts have been directed toward attenuating the obstacles these arrangements might place in the way of social advancement. They have taken the form of the establishment, in the universities, of Instituts de promotion supérieure du travail, of which there are now ten in operation. Their work is based, of necessity, on evening courses and classes, since their students are all in regular employment. A preparatory course designed to convert groups of students with very different educational backgrounds into homogeneous classes is succeeded by courses which can lead to a Diplôme d'études supérieures techniques (DEST) and, in certain instances, to admission to a school of engineering. Original experiments have been carried out on these lines particularly at the Universities of Grenoble and Nancy.

Today there are about 3,000 students at PST institutes, and provision is made for substantial grants to the best of them for one or more years to offset loss of earnings so as to enable them to complete their studies on a full-time basis.

Higher training has been further facilitated by opening the faculties more widely to non-bacheliers. In 1956, an entrance examination was instituted, subject to certain reservations, for candidates who had not had a regular secondary education. In 1961 the conditions of eligibility for the examination were widely extended to include occupational qualifications.

Concurrently, the holders of certain diplomas were made eligible to study for the licence, thanks to a more generous system of recognizing equivalences, e.g. in the case of holders of the Capacité en droit certificate or certain technicians' diplomas, such as the DEST.

It has become clear that the PST system, specially facilitated by the institutes, should also be able to make direct use of the whole gamut of university teaching and aim at the courses and diplomas intended for the student body in general.

This may necessitate adjustments of timetables, but the principle is conceded and the arrangements may be of real value in helping to place the entire university system at the service of higher training and its multifarious needs.

CONTINUING EDUCATION

The universities have become fully alive to the essential part they have to play in providing essential further education of the individual in a period of extremely and increasingly rapid and ever more intensive scientific and technical progress.

Herein, in fact, lies the remedy to the alarming tendency to saddle the young student with overloaded programmes. It should become possible, by this means, to exercise selectivity in the range of subjects for school and undergraduate studies, to allow the schools and faculties to concentrate on training the mind soundly instead of cramming it with facts.

Numerous, if sporadic, schemes (seminars, evening classes, etc.) have been introduced in faculties and engineering schools for the "reprocessing" of technicians and engineers, i.e. for bringing their knowledge up to date. Thus possibilities are being opened up for the improvement of standards and, if necessary, of retraining for other occupations.

The success of these schemes is largely dependent on the relations between the universities and industry: they are, in fact, becoming increasingly close and trusting, and in 1961, the necessary action was taken to give each University Council an attached Comité de la formation technique supérieure et de la promotion sociale (Committee for Higher Technical Training and Social Advancement) bringing university men and representatives of the economic sector together.

The importance attached to the problem of continuing education can be judged from the fact that the arrangements were made for the establishment of an Institut national de formation des adultes at the beginning of the 1962 academic year at the University of Nancy by expanding the Centre universitaire de coopération economique et sociale (CUCES), which had already made its mark in no uncertain manner at the regional level. The purpose of the new establishment was to serve as a regular national centre for research in adult

teaching techniques, and the training of individuals who will themselves, in industrial or agricultural undertakings of all kinds, and even in teaching, become the trainers of their fellows. It will thus pave the way, at all levels, for an immense expansion of teaching strength.

CHAPTER VII

CONCLUSIONS

French higher education, at present in process of vigorous expansion, through the mere fact of increasing secondary school enrolment, will, during the next few years, and particularly from 1964-1965 onwards, develop on an unprecedented scale which is illustrated by what has been observed above and by the actual estimates of the Commission de l'équipement scolaire et universitaire, namely:

a total student population by 1970 of about 500,000, of whom 450,000 will be French;
of these numbers, probably over 200,000 taking science, as many taking courses in arts, law administration or economics, and over 80,000 taking courses in medicine and pharmacology;
a University of Paris with a student body of nearly 150,000 and provincial universities with 30,000 or 40,000 each; and, generally speaking, universities with a rise in enrolment such that some of them will be three or even four times their present size in ten years time!

These prospects involve such a break with present circumstances and former evolutionary patterns that recasting has become imperative in all domains of university activity. Structures and programmes, in particular, must be redesigned to fit the diversity of aptitudes and aspirations of the students and the exigencies of effective training for the various managerial and executive functions of a modern society.

The whole complex of measures worked out in 1961 and 1962 is directed to this end, and relies essentially on a combination of three lines of action:

organization of continuing higher education at successive levels or stages logically constituted and ordered;
creation of new types of studies suited for the scientific and technological training of qualified staff for the national economy;
dovetailing and combination of disciplines for the purposes of such training within a framework of organic inter-faculty collaboration.

All these measures are already undergoing the requisite decisive test of experience. For them to succeed, more than goodwill is needed: there has to be devotion and faith on the part of all concerned. Their success also requires a substantial priority contribution by the public authorities. At the same time, we reject the soporific idea of possible measures or reforms which would be the only true and good ones, after which the French universities could look forward to a long period of stability and tranquility. And the universities indeed, are keenly conscious for their part, of the immense and unceasing effort of adaptation that they are engaged in, in the force of ever-changing circumstances, and fully realize what is thereby at stake in terms of the nation's future.

TABLE 1

Variation in annual number of births from 1935 to 1961
Estimated annual births to 1975
(in thousands)

Years	Births	Years	Births
Births registered		*Births registered*	
1935	641	1950	858
1936	631	1951	823
1937	618	1952	819
1938	612	1953	801
1939	617	1954	807
1940	562	1955	802
1941	513	1956	803
1942	571	1957	813
1943	611	1958	809
1944	629	1959	826
1945	652	1960	816
1946	840	1961	840[1]
1947	866		
1948	867		
1949	868		
Estimates		*Estimates*	
1962	783	1972	876
1963	774	1973	891
1964	770	1974	907
1965	773	1975	922
1966	784		
1967	796		
1968	811		
1969	827		
1970	844		
1971	861		

1. Estimate (INSEE, B.M. de Statistique, No. 1, Jan. 1962): it should be noted that the 1960 estimate for births in 1961 was 795,000.

Source. INSEE, "Tableaux de l'économie francaise", 1960 edition.

TABLE 2

Numbers in the 18-24 age-group
per academic year [1]
Variations from 1953-1954 to 1970-1971

Year	Numbers in group	Percentage variation between successive academic years
1953-54	4 432 400	
1954-55	4 362 500	2,6%
1955-56	4 360 200	2,2%
1956-57	4 220 300	1,1%
1957-58	4 197 300	0,4%
1958-59	4 132 000	1,3%
1959-60	4 000 100	3,2%
1960-61	3 925 500	1,9%
1961-62	3 902 700	0,5%
1962-63	3 900 900	1,0%
1963-64	3 903 400	0,3%
1964-65	4 110 000	5,5%
1965-66	4 415 900	7,2%
1966-67	4 747 700	7,5%
1967-68	5 034 900	6,0%
1968-69	5 268 900	4,6%
1969-70	5 465 700	3,7%
1970-71	5 652 400	3,4%

1. The 18-24 age group provides approximately 80% of the student body at universities in any academic year.

Source : Répartition par année de naissance de la population française scolarisable. INSEE and Min. Educ., Statistics Service, Documents No. 481 and 482.

GRAPH 2 bis

18-24 age group - Variations from 1953-54 to 1970-71

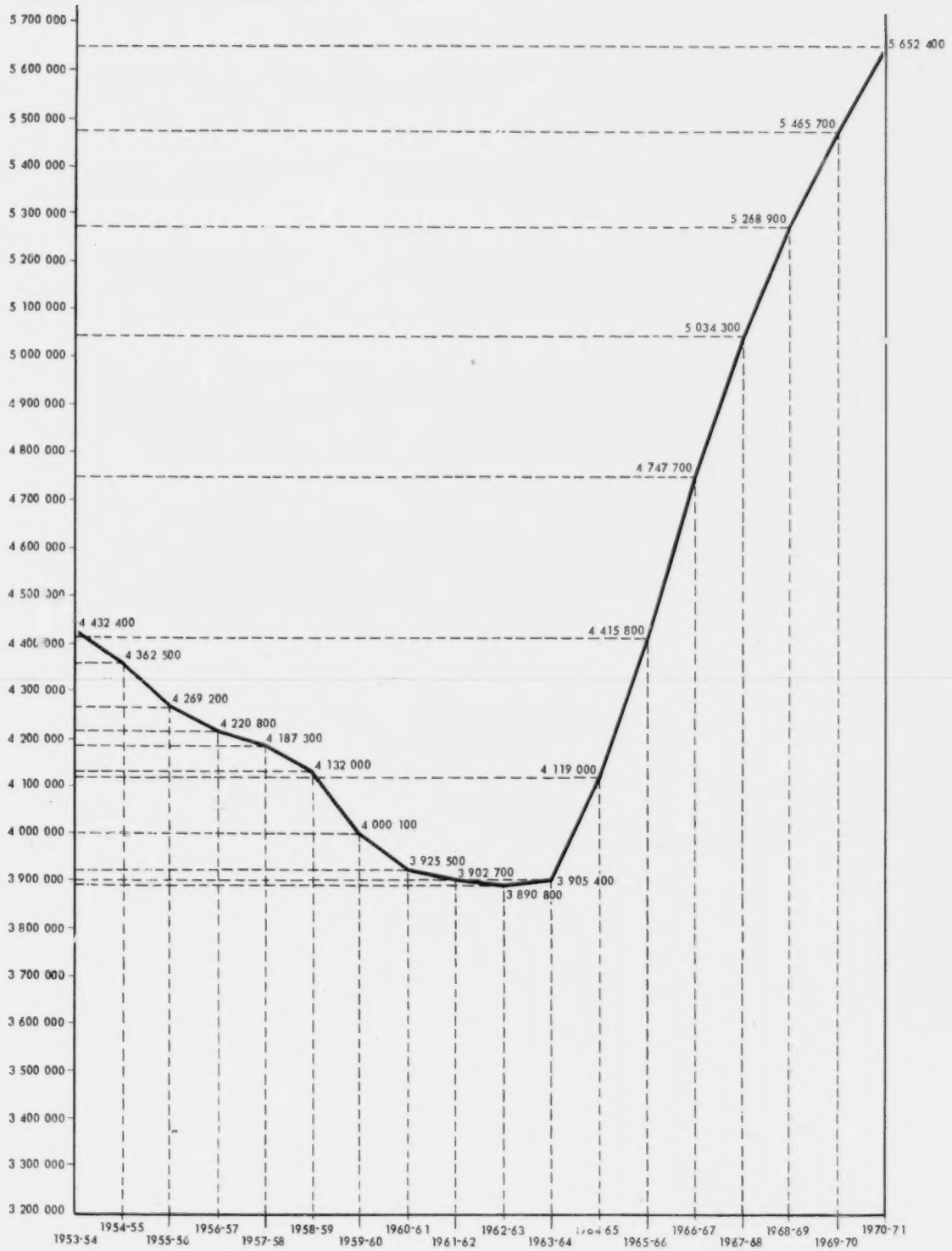


TABLE 3

Variations in enrolment at State and private, classical and modern lycées, over the period 1951-52 to 1961-62 (in thousands)

Year	Enrolment at classical and modern lycees		Total enrolment at public and private establishments
	Public	Private	
1951-52	353	187	540
1952-53	376	191	567
1953-54	398	197	595
1954-55	429	207	636
1955-56	460	217	677
1956-57	505	226	731
1957-58	570	242	812
1958-59	632	260	892
1959-60	699	278	977
1960-61	761	-	Enquêtes non terminées
1961-62	832	-	-

Source : Min. Educ., "Informations Statistiques", and work preparatory to the formulation of the 4th Plan : Inf. Stat. No. 19, February-March 1960, p. 105 ; Inf. Stat. No. 27, March 1961, p. 66 ; Inf. Stat. No. 37, p. 38.

TABLE 4

Variations in numbers of bacheliers from 1947-48 to 1960-61 and estimates from 1960-61 to 1970

Year	Number of bacheliers	Year	Number of bacheliers
1947-48	28 874	1957-58	47 678
1948-49	30 248	1958-59	49 100
1949-50	30 898	1959-60	59 287
1950-51	31 728	1960-61	61 498
1951-52	31 666		
1952-53	33 155		
1953-54	34 713		
1954-55	39 258		
1955-56	40 146		
1956-57	48 982		
Estimates		*Estimates*	
1961-62	67 800	1966-67	125 600
1962-63	76 700	1967-68	132 500
1963-64	93 500	1968-69	137 500
1964-65	108 400	1969-70	-
1965-66	116 200		

Source : Min. Educ., " Informations Statistiques ", and work preparatory to the formulation of the 4th Plan.

TABLE 5

Variations in enrolment at French universities from 1948-49 to 1960-61

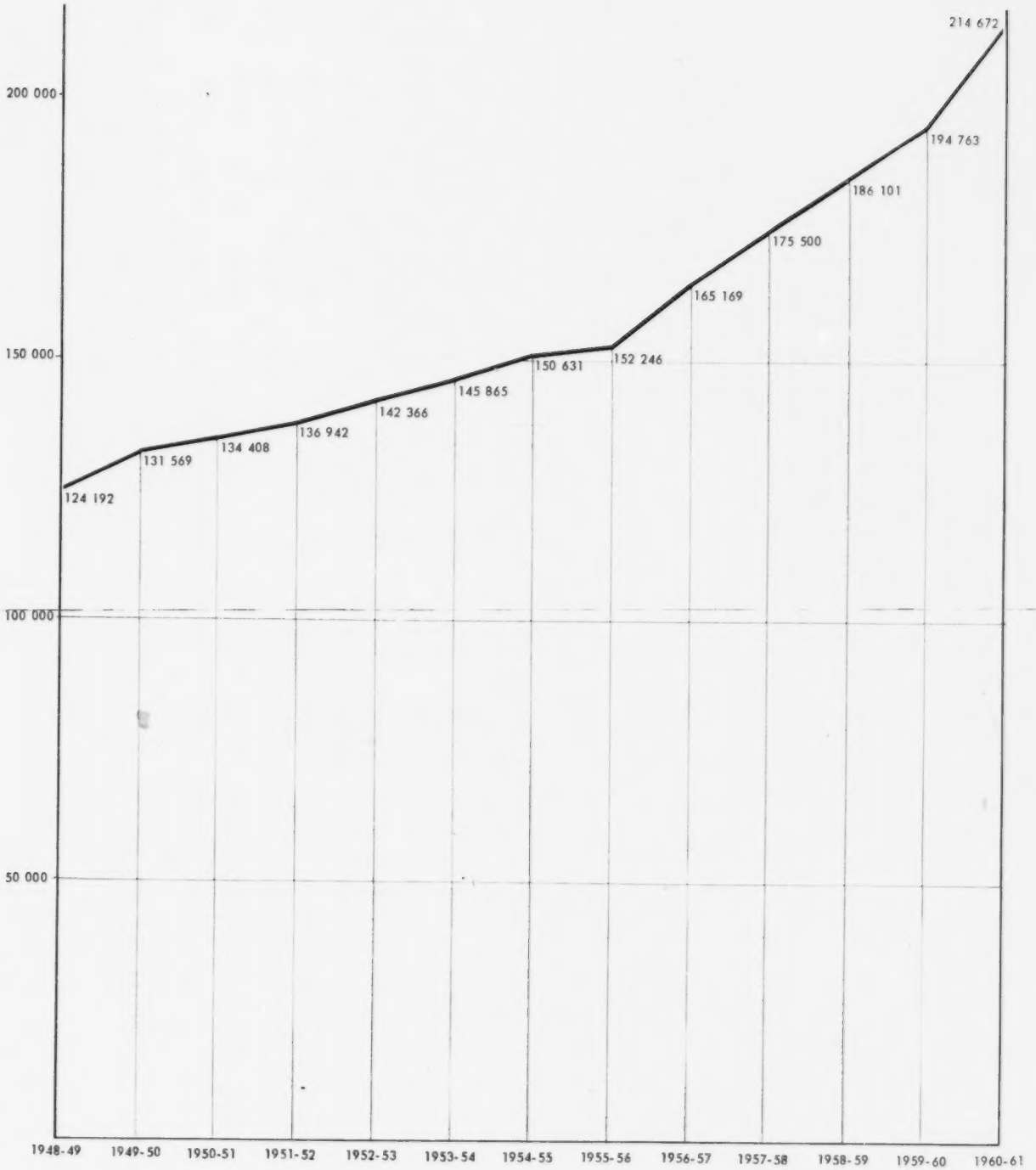
(toutes disciplines)

Universities	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61
Aix	6 553	7 186	7 556	7 836	8 050	8 906	8 947	9 679	10 724	11 986	13 093	14 399	15 486
Besançon	944	963	933	942	1 037	1 074	1 097	1 157	1 841	1 996	2 165	2 676	2 217
Bordeaux	8 077	7 951	8 147	8 367	8 802	9 057	9 463	9 511	9 853	10 747	11 281	12 583	12 267
Caen	2 698	3 301	3 083	3 232	3 371	3 469	3 786	3 826	4 338	4 843	5 319	5 511	6 357
Clermont	2 058	2 043	2 108	2 079	2 988	2 391	2 631	2 758	3 106	3 357	3 688	4 865	4 731
Dijon	1 609	1 729	1 820	1 904	2 038	2 277	2 323	2 426	2 681	2 795	3 107	3 438	3 706
Grenoble	3 979	4 244	4 199	3 993	4 262	4 271	4 602	4 685	5 446	6 121	7 083	7 740	10 007
Lille	6 232	6 162	6 382	6 374	6 635	7 077	7 229	7 406	8 483	9 380	10 585	10 805	11 503
Lyon	7 909	8 342	7 865	8 286	9 237	8 989	9 034	9 258	9 981	9 917	10 681	11 285	13 315
Montpellier	5 301	5 330	5 685	6 295	6 634	6 695	7 481	7 054	7 440	8 259	8 958	9 621	10 509
Nancy	4 460	4 441	4 602	4 731	4 910	4 949	4 861	5 231	5 690	6 313	6 789	6 788	8 234
Paris	52 318	56 829	58 958	59 609	61 166	62 395	64 285	64 151	67 806	68 785	70 538	69 904	77 796
Poitiers	3 980	4 017	4 127	4 244	4 489	4 496	4 449	4 546	4 892	5 543	5 877	6 624	6 943
Rennes	5 638	5 982	6 343	6 517	6 173	6 613	7 077	7 161	8 605	9 749	9 960	10 457	11 092
Strasbourg	4 998	5 327	5 069	5 073	5 420	5 497	5 549	5 343	5 712	6 295	6 879	7 697	8 479
Toulouse	7 438	7 722	7 531	7 460	7 554	7 709	7 817	8 054	8 571	9 414	10 108	10 970	12 070
Total	124 192	131 569	134 408	136 942	142 366	145 865	150 631	152 246	165 169	175 500	186 101	194 763	214 672

Source : Min. Educ., "Informations Statistiques"

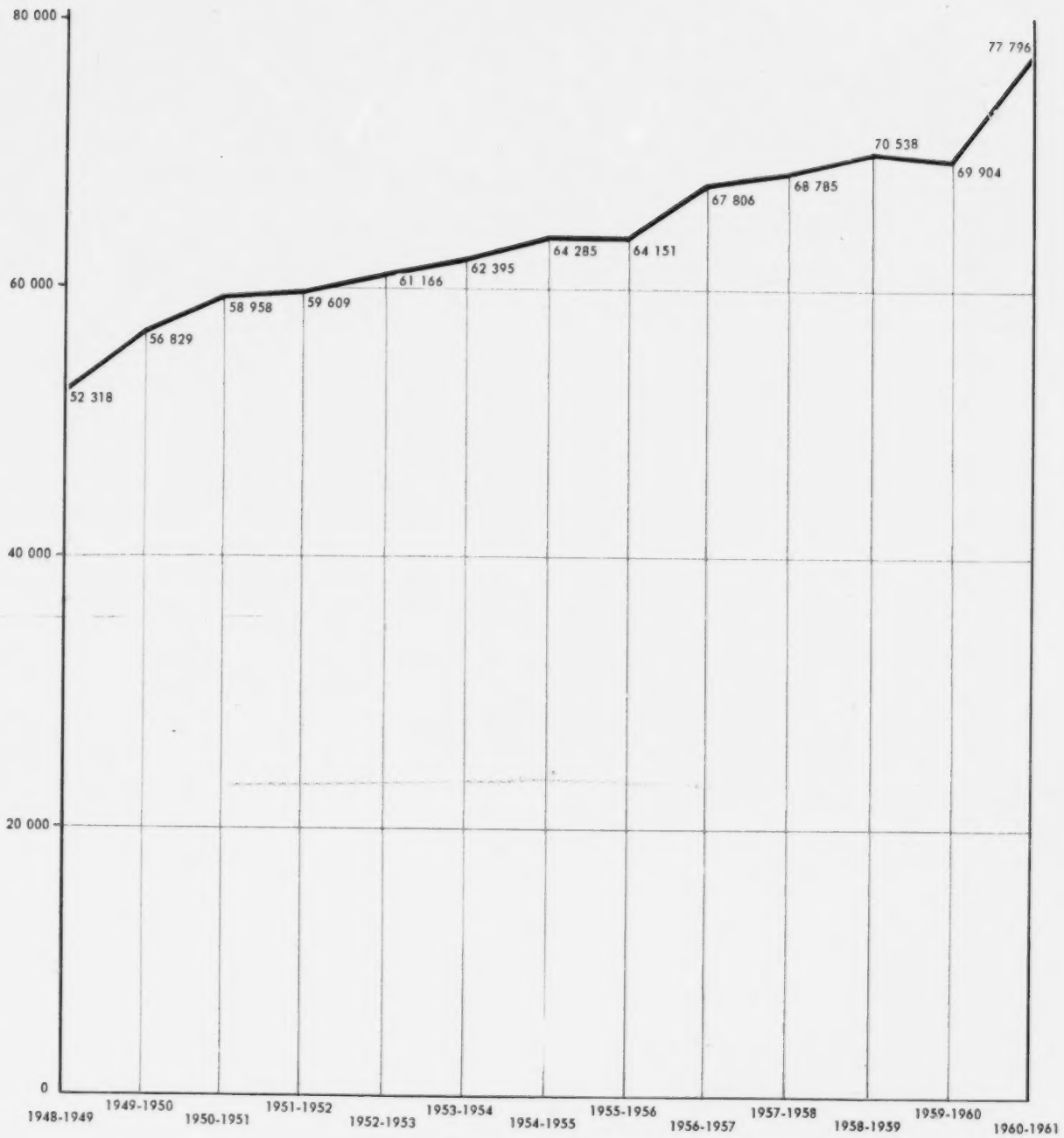
GRAPH 5

Variation in total enrolment at all universities
1948-49 to 1960-61



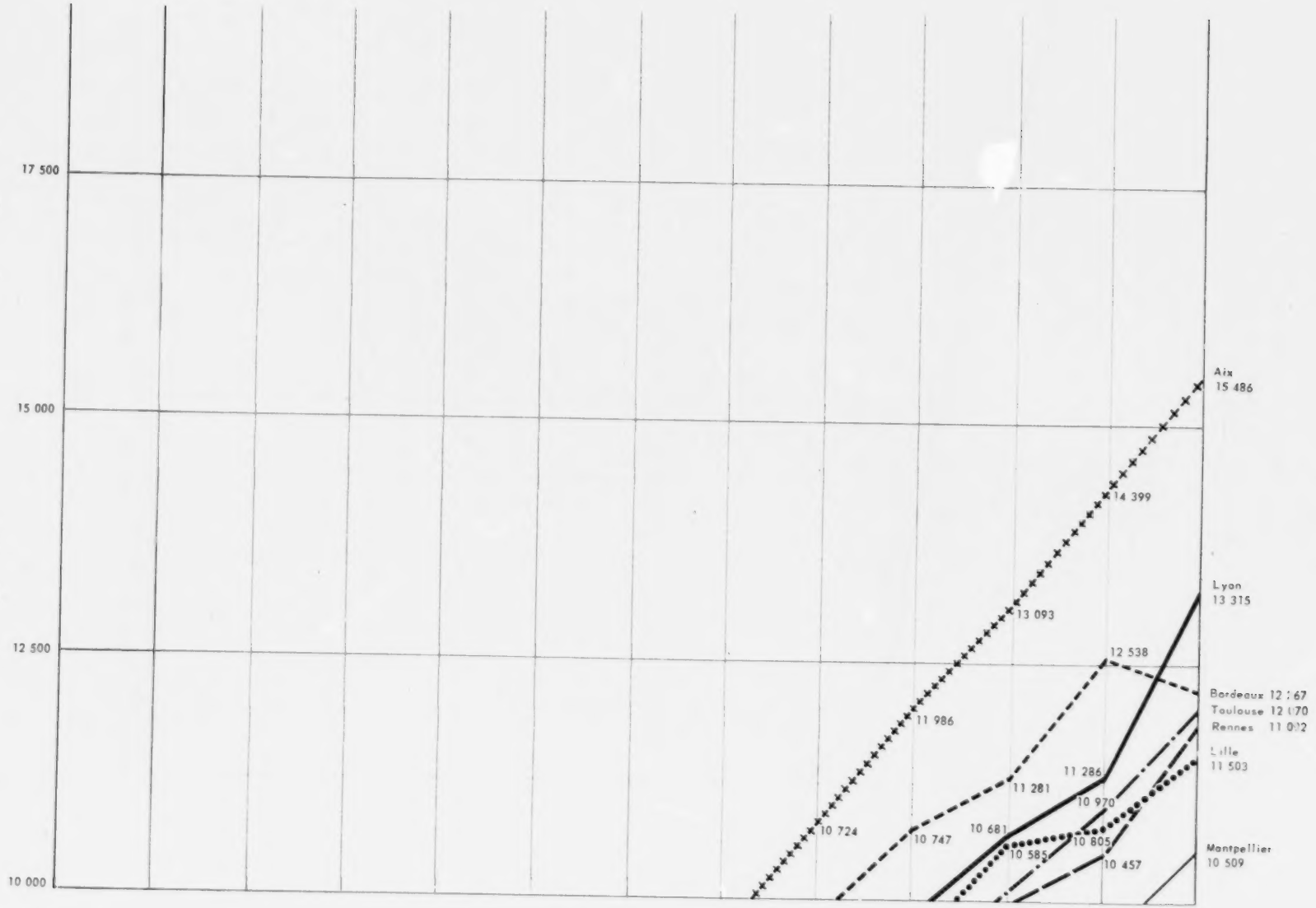
GRAPH 5 bis

Variations in total enrolment
at Paris University
1948-49 to 1960-61



GRAPH 5 ter

Variations in total enrolment at provincial universities 1948-49 to 1960-61



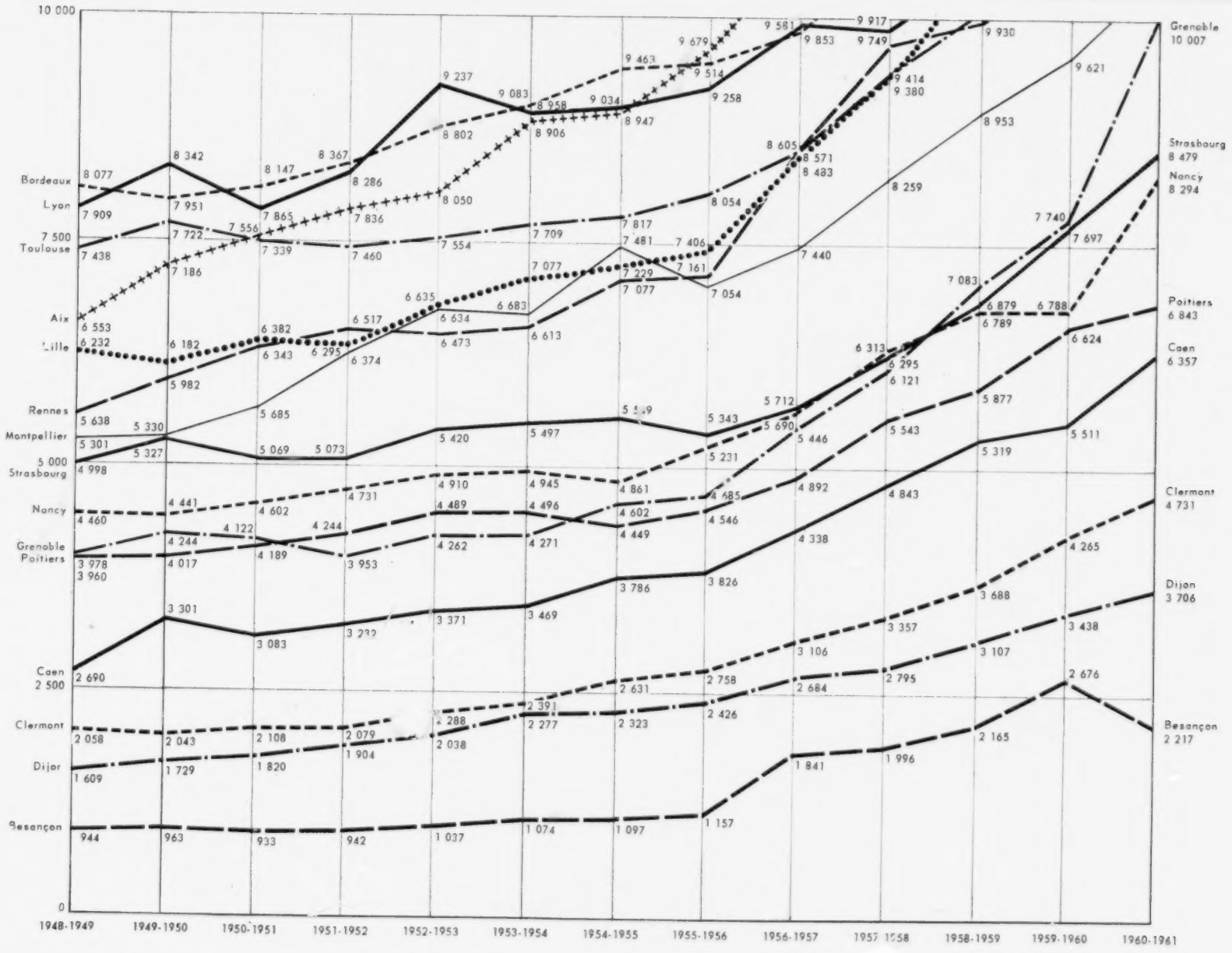

10 000
7 500
5 000
2 500
0
Bordeaux
Lyon
Toulouse
Aix
Lille
Rennes
Montpellier
Strasbourg
Nancy
Grenoble
Poitiers
Caen
Clermont
Dijon
Besançon
Grenoble 10 007
Strasbourg 8 479
Nancy 8 294
Poitiers 6 843
Caen 6 357
Clermont 4 731
Dijon 3 706
Besançon 2 217
1948-1949
1949-1950
1950-1951
1951-1952
1952-1953
1953-1954
1954-1955
1955-1956
1956-1957
1957-1958
1958-1959
1959-1960
1960-1961

TABLE 6

Variation in total enrolment at Faculties for higher scientific studies between 1948 and 1961

Year	Total for preliminary course (1st year)	Total for 2nd cycle (licence)	Total for 3rd cycle (post-graduate training for research)	Grand total
1947-48	8 862	8 354	3 150	20 666
1948-49	9 345	8 920	3 181	21 446
1949-50	10 070	8 850	4 034	22 954
1950-51	11 037	9 373	3 870	24 280
1951-52	11 689	10 080	3 763	25 532
1952-53	13 000	11 000	4 133	28 133
1953-54	14 637	11 670	3 753	30 060
1954-55	17 040	13 021	3 850	33 911
1955-56	18 785	13 660	4 719	37 164
1956-57	21 752	15 788	5 033	42 593
1957-58	25 844	18 620	5 915	50 379
1958-59	27 931	23 131	6 619	57 681
1959-60	28 395	25 785	8 511	62 691
1960-61	31 733	28 540	10 133	70 406

Source : Min. Educ : "Informations Statistiques" and work preparatory to the formulation of the 4th Plan.

TABLE 6 bis

Variations in total Arts Faculty enrolment
1948-1961

Year	Total for preliminary course (1st year)	Total for 2nd cycle (licence)	Total for 3rd cycle (post-graduate research training)	Grand total
1947-48	8 945	15 757	4 702	29 404
1948-49	7 529	16 575	5 637	29 741
1949-50	7 731	17 344	5 951	31 036
1950-51	7 838	17 462	5 874	31 174
1951-52	8 679	16 708	6 577	31 964
1952-53	7 935	16 228	9 303	33 466
1953-54	8 988	17 682	7 576	34 216
1954-55	9 605	18 299	8 477	36 381
1955-56	11 930	18 227	8 739	38 896
1956-57	14 100	21 100	7 900	43 100
1957-58	16 046	20 533	7 312	43 891
1958-59	18 145	21 968	6 824	46 937
1959-60	18 233	24 903	8 224	51 360
1960-61	20 864	28 394	10 720	59 978

Source : Min. Educ : "Informations Statistiques" and work preparatory to the formulation of the 4th Plan.

TABLE 7

Consolidated table
of university and faculty institutes,
classified by disciplines

Disciplines	Law	Arts	Medicine and Pharmacology	Science	Total
Faculty and University Institutes	94	116	98	115	423
Schools of Engineering attached to universities	-	-	-	41	41
Institute of Political Studies	7	-	-	-	7
Institutes of Management Training	13	-	-	-	13
TOTAL	114	116	98	156	484

Source: Min. Educ., General Division of Higher Education.

TABLE 8

Variations, by disciplines, in the number of students at French Universities [1]

Year	Law and Economics		Medicine		Science		Arts and Human Sciences		Pharmacology		TOTAL	
	Enrolled in Faculties	Extra-Faculty enrolment	Enrolled in Faculties	Extra-Faculty enrolment	Enrolled in Faculties	Extra-Faculty enrolment	Enrolled in Faculties	Extra-Faculty enrolment	Enrolled in Faculties	Extra-Faculty enrolment	Enrolled in Faculties	Extra-Faculty enrolment
1948-49	35 916	-	25 550	-	22 837	-	33 158	-	6 731	-	124 192	-
1949-50	37 342	-	28 200	-	24 555	-	34 507	-	6 875	-	131 569	-
1950-51	36 888	-	29 083	-	26 156	-	35 471	-	6 810	-	134 408	-
1951-52	37 674	-	29 032	-	27 348	-	36 069	-	6 819	-	136 942	-
1952-53	39 445	-	28 458	-	29 870	-	37 864	-	6 729	-	142 366	-
1953-54	39 655	-	28 652	-	31 658	-	38 666	-	7 234	-	145 865	-
1954-55	38 763	-	28 922	-	35 248	-	40 244	-	7 454	-	150 631	-
1955-56	35 486	-	29 091	-	38 290	-	41 785	-	7 594	-	152 246	-
1956-57	35 994	-	29 661	-	44 072	-	47 539	-	7 903	-	165 169	-
1957-58	33 609	-	30 423	-	53 177	-	50 245	-	8 046	-	175 500	-
1958-59	32 565	-	30 936	-	60 063	-	54 383	-	8 154	-	186 101	-
1959-60	32 473	-	31 327	-	65 506	-	57 395	-	8 062	-	194 763	-
1960-61	33 634	2 887	29 915	1 598	68 062	3 040	62 395	4 419	8 697	25	202 703	11 969
	36 521		31 513		71 102		66 814		8 722		214 672	

(1) The division of French university students into those enrolled and those not enrolled in Faculties was begun from 1960-61.

Source : Min. Educ : "Informations Statistiques".

GRAPH 8 bis

Variations by discipline
in the number of Faculty students,
1948-49 to 1960-61

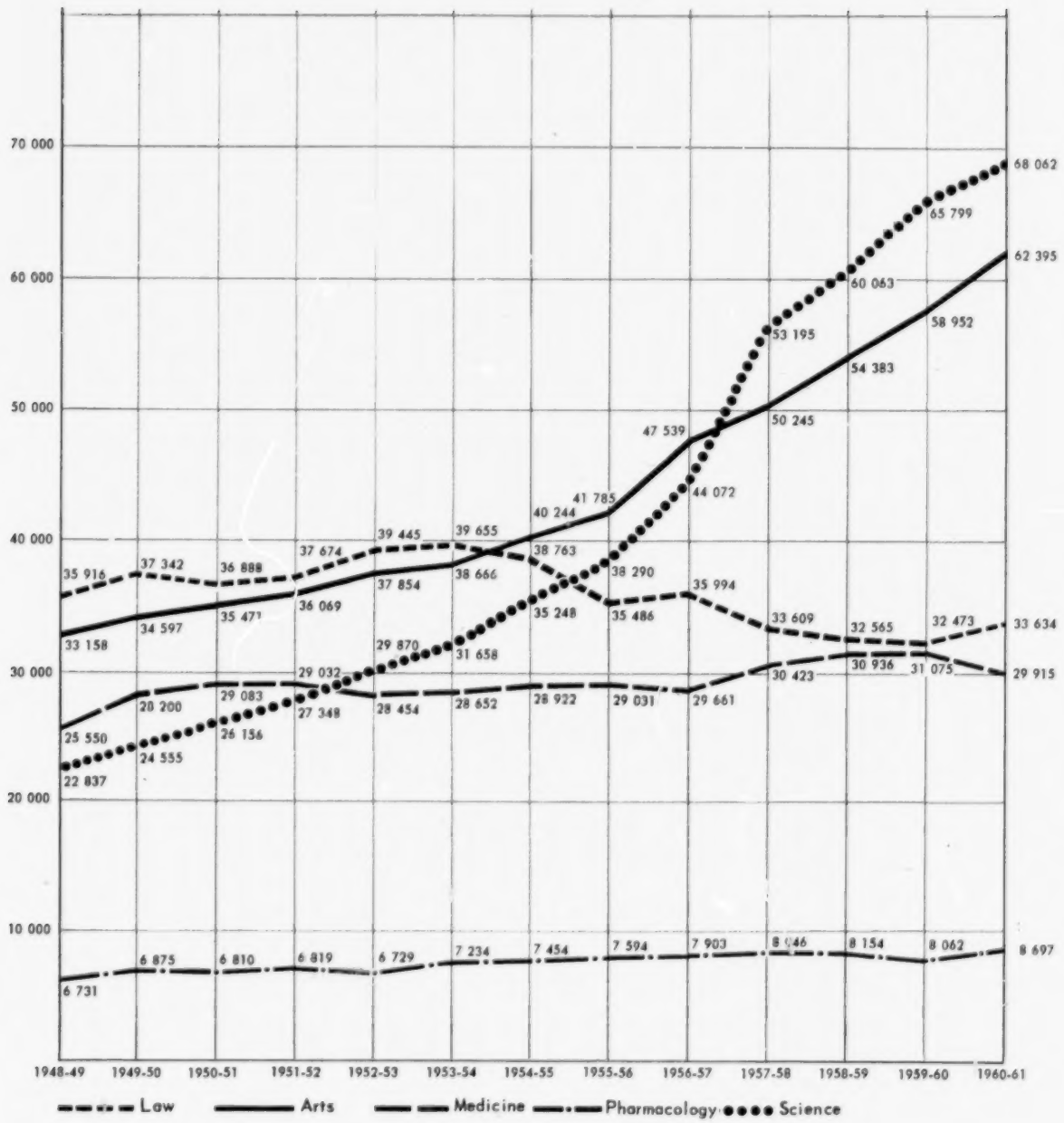


TABLE 8 ter

Variations, by disciplines, in enrolment at French universities,[1]
1961-62 to 1970
(estimates prepared for the purpose of the 4th Equipment Plan)

Year	Law	Arts	Science	Medicine	Pharmacology	Total
1961-62	35 870	67 810	84 500	38 970	9 495	236 645
1962-63	41 250	73 180	96 130	41 570	10 410	262 540
1963-64	45 570	78 650	107 250	43 050	11 300	285 820
1964-65	52 875	87 370	123 925	46 595	12 610	323 375
1965-66	59 990	97 910	144 360	50 560	14 515	367 335
1966-67	65 260	107 210	162 400	54 690	16 185	405 745
1967-68	70 990	115 570	177 010	58 600	17 630	439 800
1968-69	78 220	123 330	196 390	60 120	19 235	477 295
1969-70	83 050	130 250	210 840	61 160	20 600	505 900
	(16,4%)	(25,7%)	(41,7%)	(12,1%)	(4,1%)	(100%)

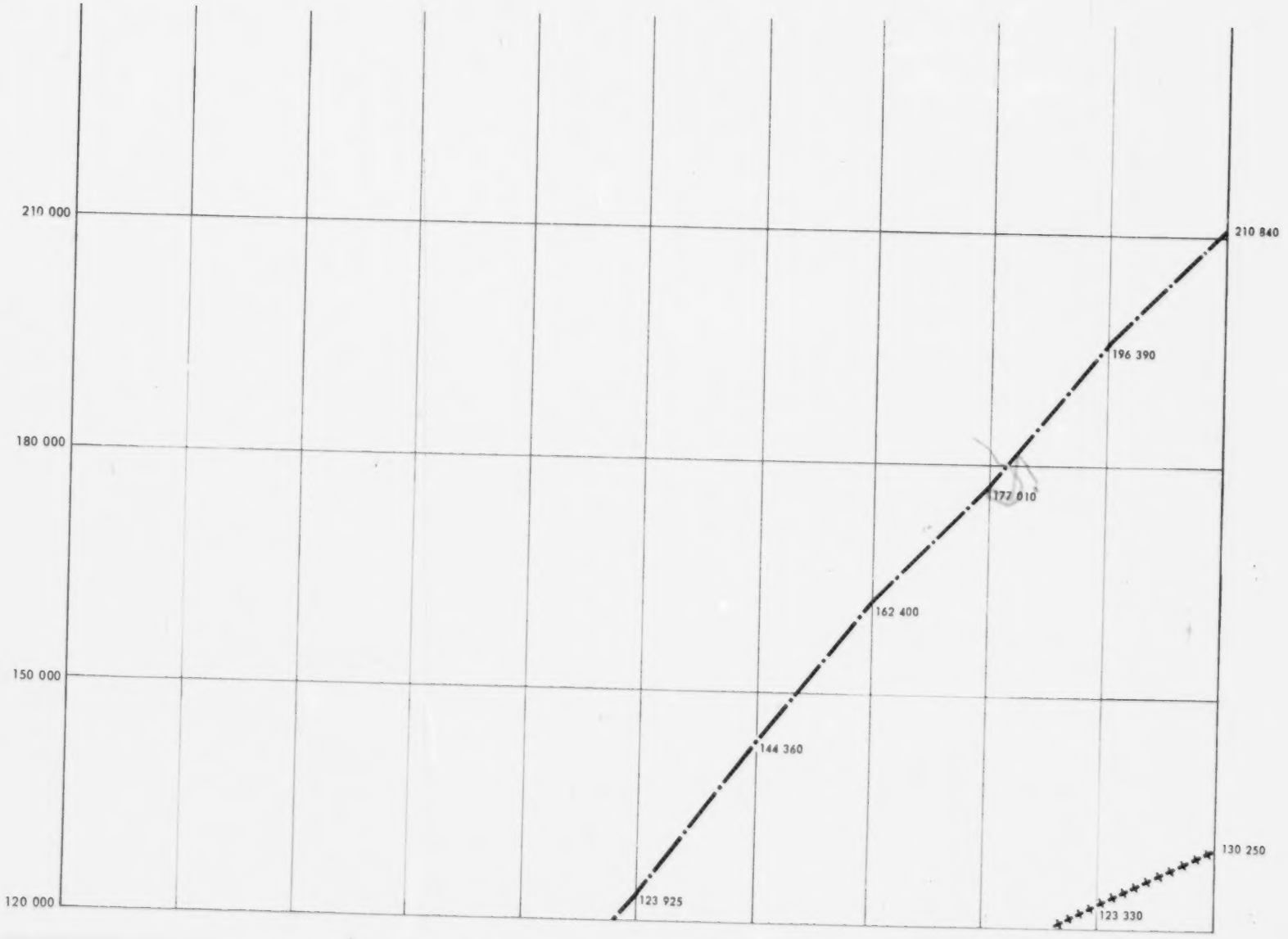
1. Excluding the Strasbourg Faculties of Theology.

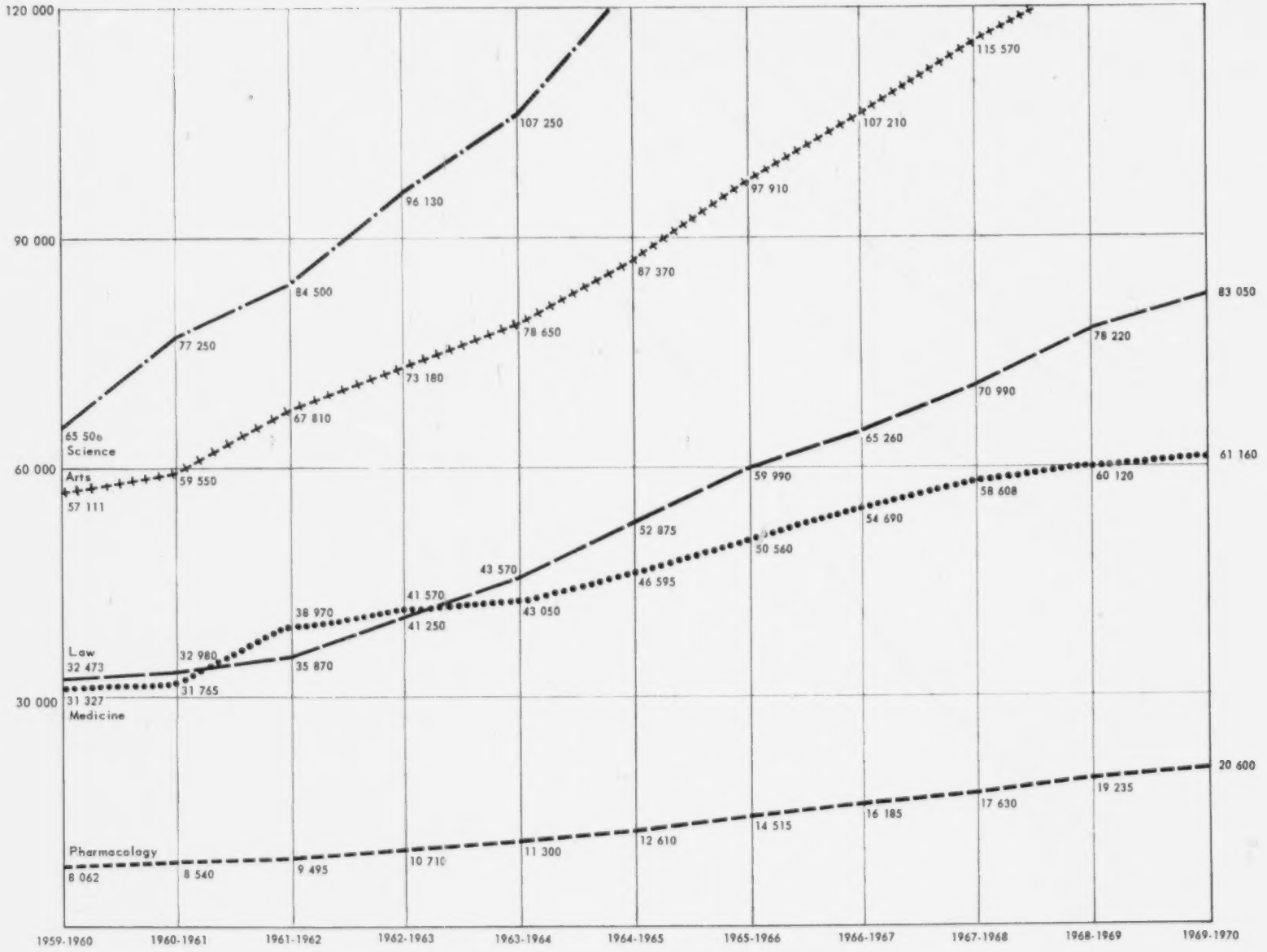
Source: General Division of Higher Education, and Report of the Commission de l'Equipement Scolaire et Universitaire.

GRAPH 9

Variations, by disciplines, in enrolment at French universities during the 10-year period 1960-1970

(estimates prepared for the purpose of the 4th Equipment Plan)

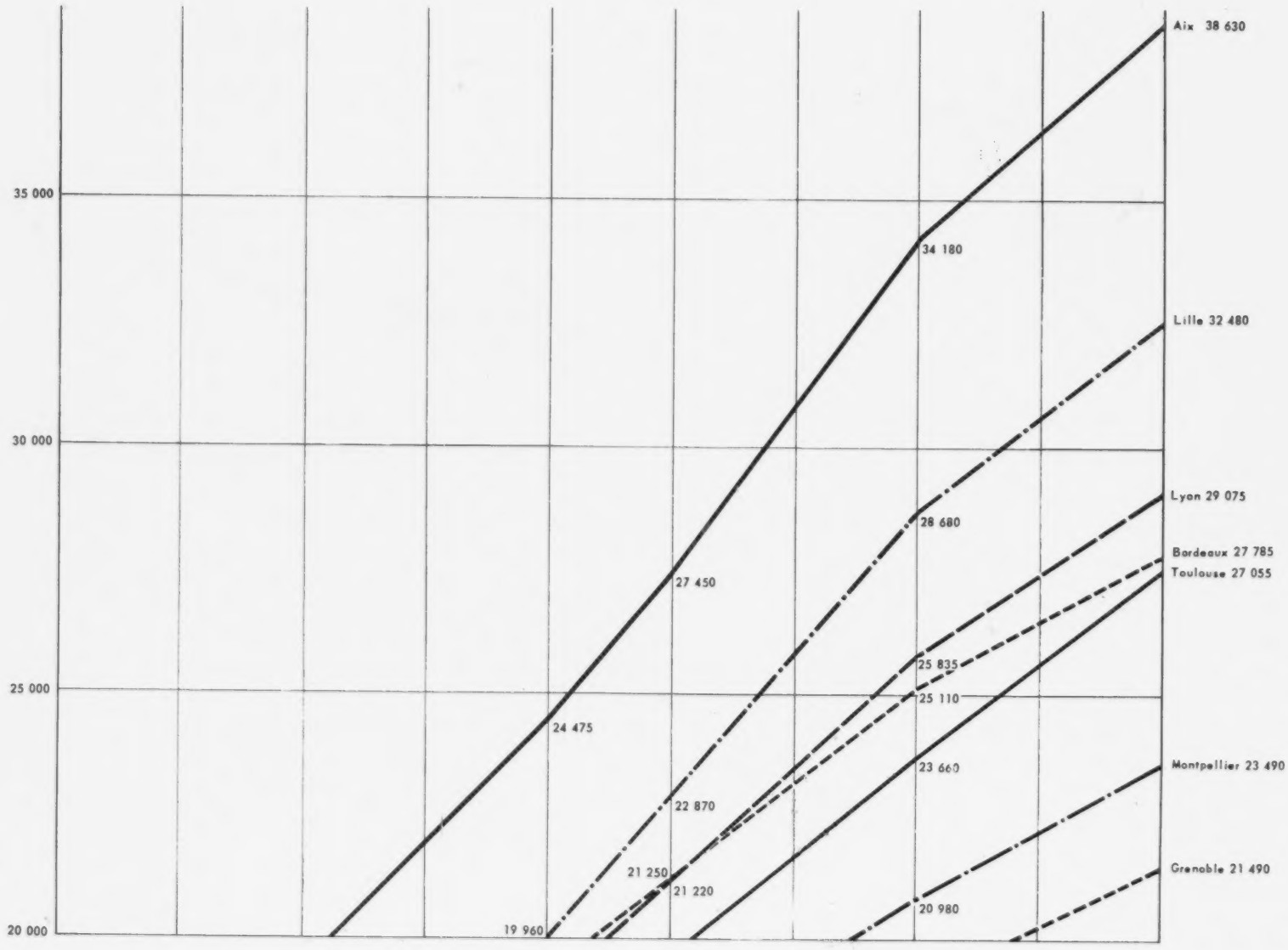


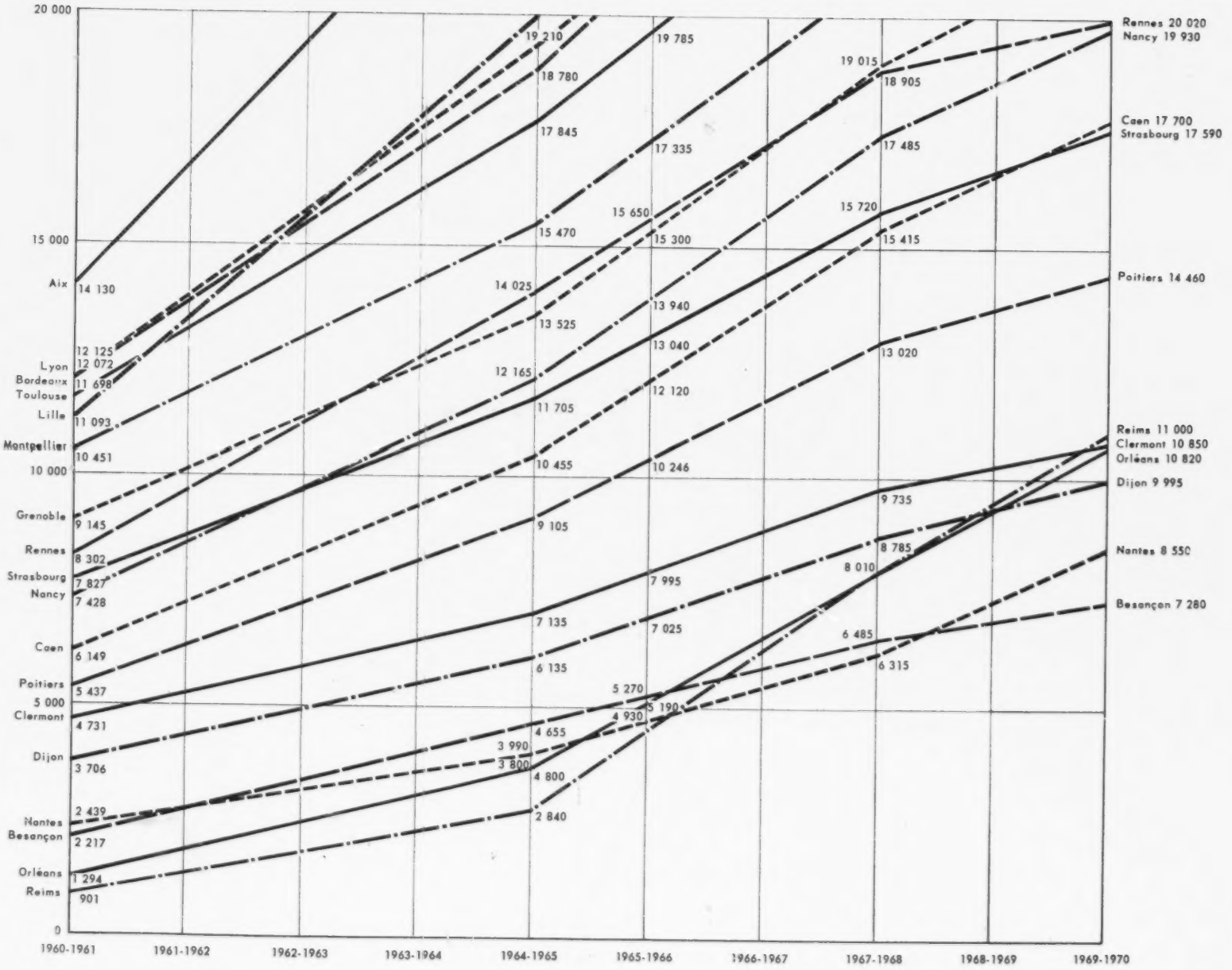

120 000
90 000
60 000
30 000
1959-1960
1960-1961
1961-1962
1962-1963
1963-1964
1964-1965
1965-1966
1966-1967
1967-1968
1968-1969
1969-1970
Science
65 506
77 250
84 500
96 130
107 250
Arts
57 111
59 550
67 810
73 180
78 650
87 370
97 910
107 210
115 570
Law
32 473
32 980
35 870
41 250
43 050
46 595
50 560
54 690
58 608
60 120
61 160
Medicine
31 327
31 765
38 970
41 570
43 570
52 875
59 990
65 260
70 990
78 220
83 050
Pharmacology
8 062
8 540
9 495
10 710
11 300
12 610
14 515
16 185
17 630
19 235
20 600

GRAPH 10

Variations in enrolment at provincial universities during the 10-year period 1960-1970

(estimates prepared for the purpose of the 4th Equipment Plan)

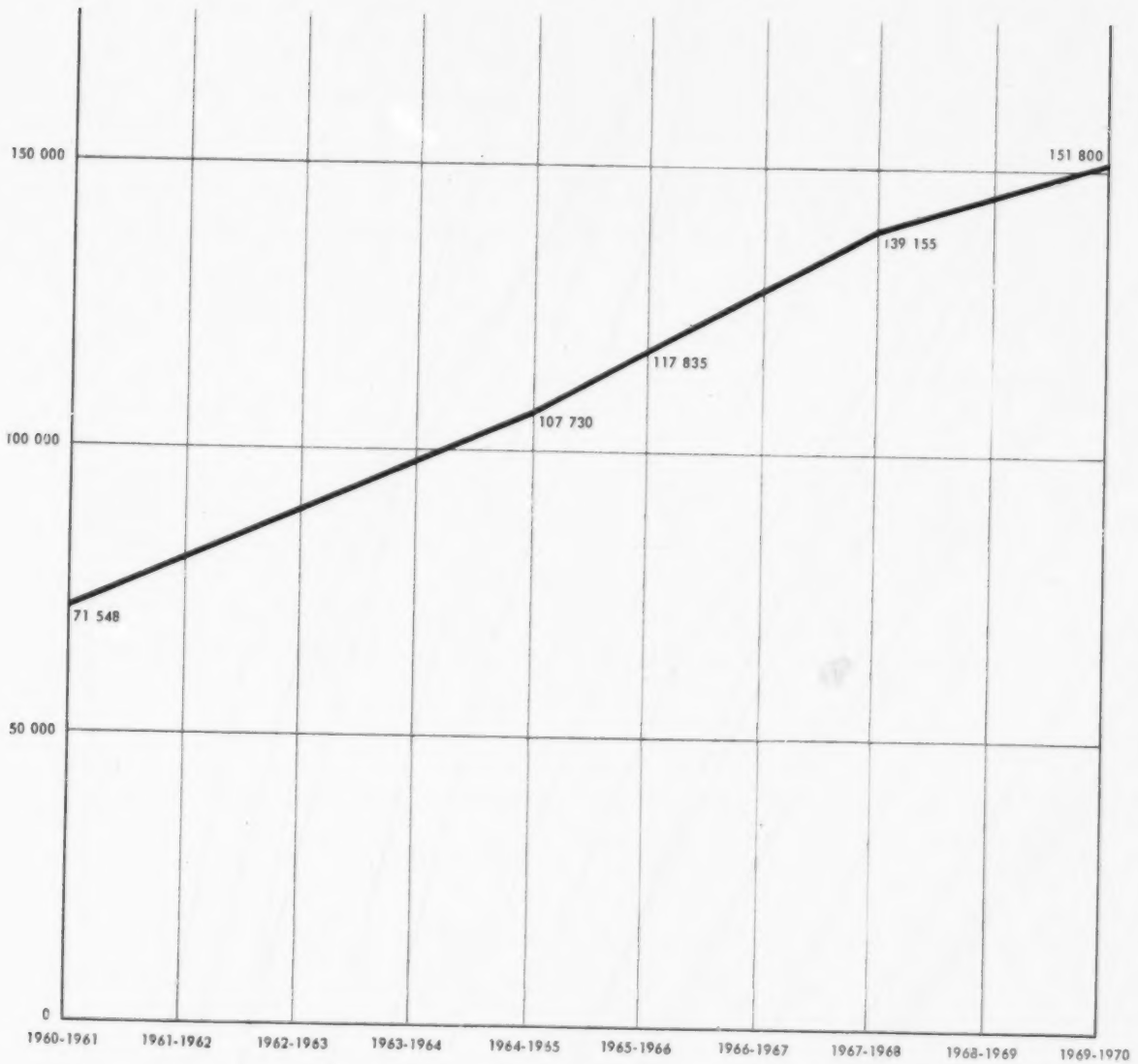



20 000
15 000
10 000
5 000
0
1960-1961
1961-1962
1962-1963
1963-1964
1964-1965
1965-1966
1966-1967
1967-1968
1968-1969
1969-1970
Aix
Lyon
Bordeaux
Toulouse
Lille
Montpellier
Grenoble
Rennes
Strasbourg
Nancy
Caen
Poitiers
Clermont
Dijon
Nantes
Besançon
Orléans
Reims
14 130
12 125
12 072
11 698
11 093
10 451
9 145
8 302
7 827
7 428
6 149
5 437
4 731
3 706
2 439
2 217
1 294
901
19 210
18 780
17 845
15 470
14 025
13 525
12 165
11 705
10 455
9 105
7 135
6 135
4 655
3 990
3 800
4 800
2 840
19 785
17 335
15 650
15 300
13 940
13 040
12 120
10 246
7 995
7 025
5 270
5 190
4 930
19 015
18 905
17 485
15 720
15 415
13 020
9 735
8 785
8 010
6 485
6 315
Rennes 20 020
Nancy 19 930
Caen 17 700
Strasbourg 17 590
Poitiers 14 460
Reims 11 000
Clermont 10 850
Orléans 10 820
Dijon 9 995
Nantes 8 550
Besançon 7 280

GRAPH 11

Variations in enrolment at Paris University

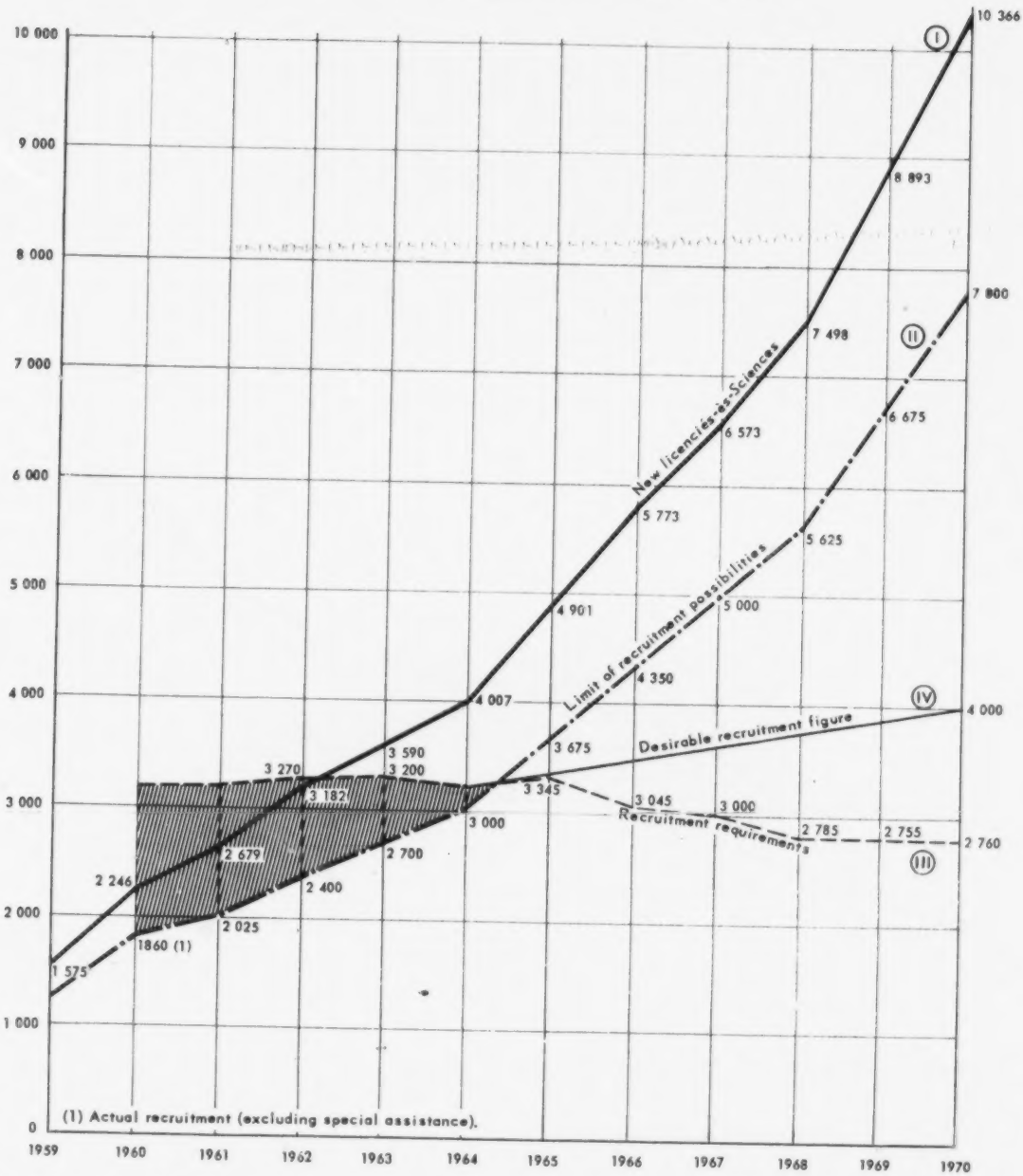
(estimates prepared for the purpose of the 4th Equipment Plan)



GRAPH 12

SCIENCE DISCIPLINES

Comparison of teaching requirements and recruitment possibilities at the licence level



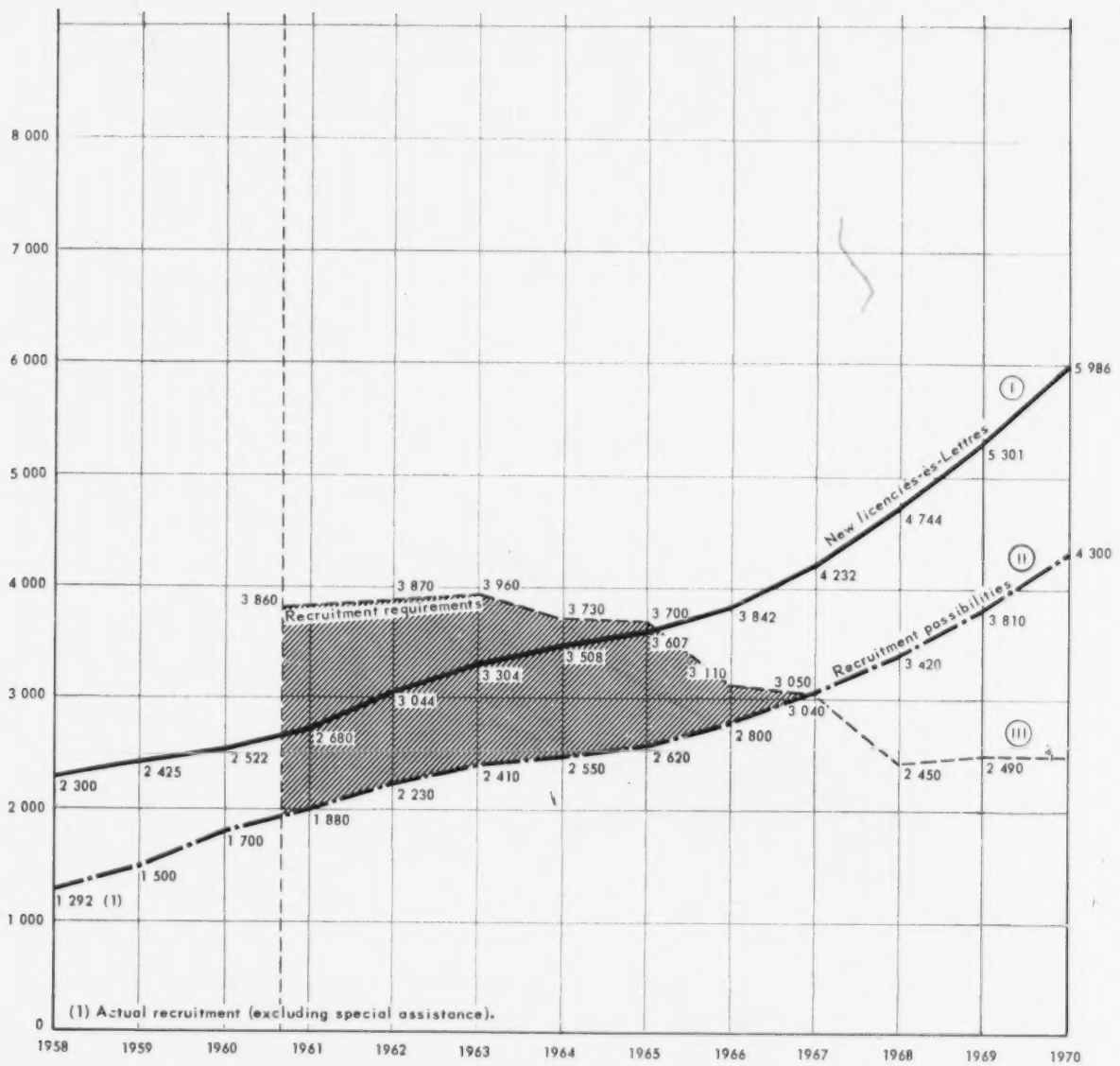
I. Variation in number of new *licenciés* in the previous year.
II. Limit of recruitment possibilities (15% of the *licenciés* for the previous year : estimate).
III. Recruitment requirements estimated by the Commission in respect of the increase in school enrolment.
IV. Graph for desirable recruitment figure, as from 1965, in the light of the shortfall ▨ for the preceding period.

Source : Estimates adopted by the Commission de l'Equipement Scolaire et Universitaire for the 4th Plan (1962-1965).

GRAPH 13

ARTS DISCIPLINE

Comparison of teaching requirements and recruitment possibilities at the licence level



I. Variation in the number of new *licenciés* in the two previous years.
II. Limit of recruitment possibilities (70% of the *licenciés* for the last year but one : estimate).
III. Recruitment requirements estimated by the Commission, in respect of the increase in school enrolment.

Source : Estimates adopted by the Commission de l'Equipement Scolaire et Universitaire for the 4th Plan (1962-1965).

TABLE 14

Organization of university studies at the various faculties

	Diplomas required	Organization of studies	Duration of studies	Examinations	Diplomas	Subsequent cycle of studies at the Faculty
LAW AND ECONOMICS						
(a) *Capacité*	Nil. Minimum age 17	Annual courses common to all students	2 years	Annual examinations	*Capacité* in Law	
(b) *Diploma in general legal studies*	*Baccalauréat* in secondary studies (or equivalent certificate)	Annual curricula with a certain choice of subjects	2 years	Annual examinations	Diploma in general legal studies	*Licence* in Law: 3rd and 4th years
(c) *Licence in Law*	*Baccalauréat* in secondary studies (or equivalent certificate)	Annual curricula with optional subjects. Specialization in the 4th year of the *Licence* course	2 years after the Diploma in general legal studies	Annual examinations	*Licence* in Law	DES, Doctorate
(d) *Licence in Economics*	*Baccalauréat* in secondary studies (or equivalent certificate)	Annual curricula	4 years	Annual examinations	*Licence* in Economics	DES, Doctorate
(e) *Diplomas in higher studies* (DES)	*Licence* in Law (or equivalent diploma)	Annual curriculum for each DES	1 year	Annual examination	DES (indicating the speciality)	Doctorate
(f) *Doctorate in Law*	*Licence* in Law (or equivalent diploma) and DES in the appropriate doctorate subject	Preparation of a thesis	Unlimited	Defence of thesis	Diploma of Doctor of Law	
(g) *Doctorate in Political Sciences*	*Licence* in Law (or equivalent diploma) and DES in Political Sciences	Preparation of a thesis	Unlimited	Defence of thesis	Diploma of Doctor of Political Sciences	

	Diplomas required	Organization of studies	Duration of studies	Examinations	Diplomas	Subsequent cycle of studies at the Faculty
LAW AND ECONOMICS (cont'd)						
(h) *Doctorate in Economics*	*Licence* in Law (or equivalent diploma) and DES in Economics	Preparation of a thesis	Unlimited	Defence of thesis	Diploma of Doctor of Economics	
MEDICINE						
(a) *Doctorate in Medicine*	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) 3 years of general scientific training and preparatory medical studies. Annual curricula (2) After passing the preceding 3 annual examinations, 3 years of medical training. Annual curricula (3) Preparation of a thesis which is defended after passing the 6 previous annual examinations.	At least 6 years	Annual examinations	Diploma of Doctor of Medicine	
(b) *Certificates of special studies (CES)*	*Doctorate* in Medicine or 6 years of successful study or resident medical studentship or diploma from a foreign Faculty of Medicine	Individual curriculum for each speciality	Varies according to CES	Special system depending on CES	CES (indicating the speciality)	
(c) *Diploma in Dental Surgery*	*Baccalauréat* in secondary studies (or equivalent certificate)	Annual courses common to all students	5 years	Annual examinations	Diploma in Dental Surgery	

PHARMACY

(a) *State Diploma in Pharmacy*	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) One year of general scientific training (2) After passing the first year examination, 2 years of general scientific training and preparatory studies in Pharmacy. (3) After passing the preceding annual examinations, 1 year of pharmaceutical training common to all students. (4) After passing the preceding annual examinations, one year's specialization, with choice of subjects. Annual curricula.	5 years	Annual examinations	State Diploma in Pharmacy	CES, Doctorate
(b) *Certificates of Higher Studies*	*Diploma* in Pharmacy and entrance examination	Annual courses in all selected subjects	1 year	Annual examinations	Certificate of Higher Studies (indicating the speciality)	Doctorate
(c) *State Doctorate in Pharmacy*	*Diploma* in Pharmacy and specified certificates in science or pharmacy	Preparation of a thesis in a laboratory	Varies	Defence of thesis	State Doctorate in Pharmacy	
(d) *Certificates of Special Studies (CES)*	Diploma in Pharmacy (or equivalent qualification)	Annual courses for all CES	1 year	Annual examinations	CES (indicating the speciality)	

	Diplomas required	Organization of studies	Duration of studies	Examinations	Diplomas	Subsequent cycle of studies at the Faculty
SCIENCES						
I - *General Training*						
(a) *Diplomas in General Scientific Studies (D E S G)*	*Baccalauréat* in secondary studies	(1) Preparatory Certificate of Higher Studies for the *Licence* (2) Two Certificates of Higher Studies for the *Licence*, chosen from groups of basic certificates taken after obtaining the Preparatory Certificate	Unlimited. Possible in 2 years	Annual examination for each Certificate	D E S G., specifying mathematical sciences; physical or natural sciences	*Licence*
(b) *Teaching or Doctorate Licence*	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) Preparatory Certificate of Higher Studies for the *Licence* (2) 5 to 7 Certificates of Higher Studies with choice of subjects, taken after obtaining the Preparatory Certificate	Unlimited. In practice, 3 to 5 years	Annual examination for each Certificate	Teaching or Doctorate Diploma of the *Licence* in Science	D E S, Doctorates, C A P E S, *Agrégation*
(c) *Licence libre*	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) Preparatory Certificate of Higher Studies for the *Licence* (2) 5 Certificates of Higher Studies for the *Licence*, taken after obtaining the Preparatory Certificate	Unlimited. In practice, 3 to 5 years	Annual examination for each certificate	Diploma of the *Licence* in Science	D E S, 3rd cycle Doctorates, University Doctorates

II - *Higher Technical Training*						
(a) *Diplomas of higher technical studies (DEST)*	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) Preparatory Certificate of higher studies for the *Licence* or certain parts of this certificate (2) After award of this certificate : (a) a specified certificate of higher studies for the *Licence* (b) a certificate of technology (3) A practical nine-month course	Unlimited. Possible in three years (including the practical course)	Annual examination for each certificate	DEST (indicating the speciality)	*Licence* in Applied Sciences
(b) *Licences* in applied subjects	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) Preparatory certificate of higher studies for the *Licence* (2) After award of this certificate : (a) Certificates in technology of the corresponding DEST (b) Four specified certificates, two of which may be taken outside the Science Faculty	Unlimited. In practice, 3 to 5 years	Annual examination for each certificate	Diploma of the *Licence* in Applied Sciences (indicating the subject)	Doctorate in Applied Sciences
III- *Diploma of higher studies in Science*	Nil	Individual work leading to the preparation of a memoir	Unlimited. In practice, one year	Defence of memoir	DES in mathematical, physical or natural sciences	*Agrégation*, Doctorate in Science
IV- *Doctorates*						
(a) *University Doctorate*	Degrees and diplomas at the discretion of the Faculty	Preparation of an original thesis	At least two years	Defence of thesis	Diploma of University Doctorate	

	Diplomas required	Organization of studies	Duration of studies	Examinations	Diplomas	Subsequent cycle of studies at the Faculty
SCIENCES (cont'd)						
(b) *Diploma of Doctorate of Engineering*	(1) *Baccalauréat* in secondary studies (or equivalent certificate) (2) Diploma in engineering (3) Preparatory CES for the *Licence* (or equivalent certificate) (4) Two CES for the *Licence* (unless exempted therefrom). Special system for foreigners	Preparation of a thesis	At least two years	Defence of thesis	Diploma of Doctorate of Engineering	
(c) *3rd cycle Doctorate*	*Licence* in Science	Introduction to research in a particular specialty, leading to a certificate of specialized higher studies and preparation of a thesis	At least two years	Oral examination and defence of thesis	3rd cycle Diploma (stating the speciality)	
(d) *State Doctorate* in Sciences	*Licence* in Science leading to Doctorate (or its equivalent)	Preparation of an original thesis	Unlimited (in practice at least 4 to 5 years)	Defence of thesis	Diploma of Doctor of Sciences in : Mathematical Sciences, Physical Sciences, Natural Sciences	
(e) *Doctorate* in *Applied sciences*	*Licence* in Science leading to a Doctorate, or *Licence* in Applied Science with Special CES or Engineering Diploma with Special CES	Preparation of an original thesis	Unlimited (at least 4 to 5 years)	Defence of thesis	Diploma of Doctor of Applied Sciences	

ARTS AND HUMAN SCIENCES

I - *General Training*						
(a) *Teaching and Special Licences in Arts*	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) Certificate of General Arts Studies (CELG) (2) 4 individual Certificates of Senior Studies, taken after obtaining the CELG	Unlimited (in practice 3 to 5 years)	Annual examination for each certificate	Diploma of the *Licence* in Arts	DES Doctorate, CAPES, *Agrégation*
(b) *Licence Libre*	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) CELG (2) 4 certificates of higher studies taken after obtaining the CELG	Unlimited (in practice 3 to 5 years)	Annual examination for each certificate	Diploma of the *Licence* in Arts	DES Doctorate
II - *Higher Technical Training*						
(a) Diploma in Practical Arts Studies (DELP)	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) CELG (2) (a) A specified Certificate of Higher Studies for the *Licence* (b) Certificate in Technology, taken after obtaining the CELG	Unlimited (possible in 2 years)	Annual examination for each certificate	Diploma in Practical Arts Studies	Specialized *Licence*
(b) Specialized *Licences*	*Baccalauréat* in secondary studies (or equivalent certificate)	(1) CELG (2) (a) Certificate in Technology (b) 3 specified Certificates of Higher Studies (one of which may be studied for at a different Faculty) after obtaining the CELG	Unlimited (in practice 3 to 5 years)	Annual examination for each certificate	Specialized *Licence*	
III - *Diploma of Higher Studies in Arts*						
	Licence in Arts	Individual work leading to the preparation of a memoir	Unlimited (in practice 1 year)	Oral examination and Defence of memoir	Diploma in Higher Studies	*Agrégation* Doctorate

	Diplomas required	Organization of studies	Duration of studies	Examinations	Diplomas	Subsequent cycle of studies at the Faculty
ARTS AND HUMAN SCIENCES (cont'd)						
IV - *Doctorates*						
(a) *University Doctorate*	*Licence* in Arts (or equivalent diploma)	Preparation of a thesis	At least 2 years	Oral examination and defence of thesis	Diploma of University Doctorate	
(b) *3rd Cycle Doctorate*	*Licence* in Arts (or diplomas and studies recognized as equivalent)	(1) First year : research work leading to an oral examination and presentation of a report; (2) Second year : research work leading to the preparation of a thesis	At least 2 years	Defence of thesis	3rd Cycle Doctorate in the speciality concerned	
(c) *State Doctorate*	*Licence* in Arts (or equivalent diploma)	Individual research and preparation of two thesis	Unlimited	Defence of thesis	Diploma of Doctorate of Arts	
ENGINEERING SCHOOLS OF HIGHER EDUCATION						
(a) Higher National Schools of Engineering (ENSI)	Recruitment by competative examination or, in exceptional circumstances, on the basis of diplomas *Admission to competitive examination :* Preparatory classes at *lycées* or the Faculties of Science, or preparatory years at the Schools themselves	Annual courses, which may include the preparation of a *Licence* in Science	As a general rule, 3 years	Annual examinations, which may be supplemented by taking the *Licence* certificates	Diploma of Engineering	Diploma of Doctorate of Engineering

	Admission on the basis of diplomas : Intended for foreign nationals candidates from the French *Communauté*, candidates from industry					
ENGINEERING SCHOOLS OF HIGHER EDUCATION (cont'd)						
	seeking higher training, and students holding particular licences or the DEST					
(b) *Schools of Engineering*	Recruitment is normally by competitive examination admission arrangements : usually similar to those for the ENSI	Annual curricula which may include the preparation of a science *Licence*	Usually 3 years	Annual examinations which may be supplemented by taking *Licence* certificates	Diploma in Engineering	Diploma of Doctor of Engineering
(c) *National Institutes* (INSA)	Recruitment of qualified candidates on the basis of the mathematics *Baccalauréat*, school record and an interview with a selection committee	Annual curricula	One preparatory year plus three further years	Annual examinations Candidates are admitted to the 3-year course on the basis of their results during the preparatory year	Diploma in Engineering	Diploma of Doctor of Engineering

PART TWO

HIGHER EDUCATION IN THE NETHERLANDS

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CHAPTER ONE

INTRODUCTION

PURPOSE OF UNIVERSITY EDUCATION

As the Netherlands is part of the Western world it is logical that its university education should bear the stamp of the West; in other words, that the basis and purposes of Dutch higher education should be the same as those of other Western countries. Nevertheless, the present treatise clearly shows that within this general pattern Dutch university education has its own character which reflects the national character. That development can take place along such individual lines follows from the freedom which characterizes the structure of the Western world and which is evident both in the relationship between the university and the State and also in the liberty of the scientific worker in pursuing his research. This freedom gives scope for a purposeful higher education policy and excludes programmes that treat university training and the pursuit of scientific knowledge as mere instruments in the realization of a specific social structure.

Although the policy of Dutch higher education is outlined in this essay, Dutch educational authorities are fully aware of the limitations of planning. This awareness is of the greatest importance, since it modifies the nature and extent of government intervention in university training and scientific pursuits. Personal initiative should be permitted to play a large part in such matters for, although large-scale government intervention may appear to be effective for a certain period, continuing disregard of human freedom is bound eventually to have repercussions. University training can only bear fruit where a healthy freedom protected by government can develop. A policy based on the belief that conditions can be improved provided people can be encouraged to make changes on their own initiative is something quite different from governmental compulsion. Government action should never degenerate into the planned imposition of rules.

Higher education in the Netherlands has its own national character, but in order to understand the Dutch system it may be useful to focus it against the background of the British and German systems.

A most important difference between the British and Dutch system lies in the wider aims that traditionally characterize British university training. University training in Britain is as much education as it is training; it aims at imparting not only a certain sum of knowledge but also a certain style of living. The latter aim cannot fail to be influenced directly by the university authorities. The method of selection for admission, the typical British forms of housing for students (colleges, halls of residence) and the tutorial system, all enable British universities to exercise control over the style of life and atmosphere of the student community. The Anglo-Saxon university aims at producing good citizens rather than great scientists. This does not, of course, prevent research from occupying a most important place in the British university system nor does it hinder attempts to improve performance in the research field where post-graduate students, i.e. research students, form a majority of those involved. Cardinal Newman in his The Idea of a University Defined, states in a well-known passage: "If I had to choose between a so-called university which dispensed with residence and tutorial superintendence, and gave its degrees to any person who passed an examination in a wide range of subjects, and a university which had no professors or examinations at all, but merely brought a number of young men together for three or four years and then sent them away.... I have no hesitation in giving the preference to that university which did nothing, over that which exacted of its members an acquaintance with every science under the sun".

It is the German tradition, however, which has had the profoundest influence on the Dutch system. The German university sprang from the scientific conceptions of the idealistic philosophy of the first few decades of the Nineteenth century. It started with the foundation of Berlin University by Wilhelm von Humboldt in 1810. To him and his spiritual kinsmen (such as Fichte and Schelling) the veneration of scientific truth was a religious experience. At schools, established knowledge is imparted; the teachers are there to serve the pupils. At the university, both are there to serve science. Professors and students alike seek the Truth. Thus man receives his highest education and the opportunity to develop all his talents in depth. Freedom and aloofness from the world are vital conditions for the progress of science.

There are many reasons why these ideas from which the German university sprang have been criticized. The social reality of today is, in fact, radically different from that of Von Humboldt's time when it was possible to establish a university for a small and very select group, yet both the Dutch and the German universities still owe their fundamental characteristics to these beginnings.

Let us now turn to the Dutch system, taking as our starting point the Higher Education Act(1) (Wat op het wetenschappelijk onderwijs) which became operative on 1 January 1961.

In this Act, the Dutch legislature has endeavoured to adapt the legal provisions for university training in the Netherlands to modern requirements and to give universities such opportunities for development as are commensurate with the vital importance of university education and the pursuit of scientific knowledge.

According to the definition laid down in the Act, higher education comprises training in the independent pursuit of knowledge and preparation for positions in society for which a scientific training is required or desirable. One of the main features of the system is the priority given to scientific research. Research cannot be divorced from the imparting of knowledge and in the preparation for positions in society also scientific methods and scientific thinking are a first consideration. Another fundamentally significant concept is that the quest for truth underlying university study is valuable for its own sake. There is the conviction, too, that the university can work only in an atmosphere of freedom, and this applies to the relationship between university and State as well as to internal conditions. Scientific workers are not fettered and the student shares that freedom; the professor's freedom in teaching finds its counterpart in the student's freedom to learn. Much is left to the student's own choice and initiative; he is treated as an adult. These fundamental ideas, however, are rightly interpreted in a modern sense by other sections of the Act which make the collective responsibility of the faculty a first principle of university life and call for student representation at faculty meetings. Finally the third part of the definition of university education given in the new Act covers the danger that specialization in science will have too great an influence on university education and encourages students to gain an insight into the relationship between the different sciences.

The next section of the Higher Education Act supplements the definition given in Section 1. It states that, in addition to giving tuition, universities(2) shall aim at the pursuit of knowledge and shall encourage a sense of social responsibility in students. Such legal recognition of this latter duty as one of the aims of the university shows that, in the Western world, education is socially oriented whilst fully maintaining the freedom of outlook and the responsibility of the individual. Legislation should never be allowed to reach a point where education becomes subservient to the realization of a specific social structure.

The British system is directed at fostering the team spirit and the ideal of the gentleman, of remaining loyal, of never letting another fellow down and of playing the game fairly, not for oneself but for the team. The British university goes in for intellectual training for its own sake, not for any purpose imposed from without. Consequently, the British university provides, in principle, general and not specialized training and there is no very close connexion between training and profession. This is shown, for instance, in a report of the University Grants Committee(3) on the difficulties of forecasting the requirements per branch of study, ".... nor will the supply of lawyers depend on the number of those who read law at universities, since many of the most successful lawyers have preferred to read other subjects at universities and defer their professional training until after graduation".

British university degrees, as such, confer no official recognition of professional status. Professional training for lawyers, doctors, etc. is organized separately. It can be said of Britain that she has succeeded in keeping the university climate "pure" - at least in this respect - by not including professional training in university education. According to the conceptions of German idealism, too, the university is no place for professional training and it was not introduced in university institutions until long after idealism had become firmly established in Germany.

As we have already stated, the aim of the Dutch university is to prepare students for the independent pursuit of knowledge and at the same time for their future place in society. The Dutch system differs from the British in that in the Netherlands the emphasis is laid on turning out men or women capable of thinking and working scientifically, whereas in Britain inculcation of the team spirit comes first. But however much university education in the various nations of the Western world may differ, the primary object of the training is not to turn out the professional men and women needed by the State, but to produce human beings who, however useful they may be socially, can find lifelong happiness in work that, freely chosen, offers them the opportunity for the fullest possible personal development.

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(1) In this Act the term "hoger onderwijs" (higher education), was changed to "wetenschappelijk onderwijs" (scientific education). However, since the term "higher education" is better known internationally, we continue to use it here.

(2) The term university includes also the Technische Hogescholen (Technological Universities) in Delft, Eindhoven and Enschede, the Landbouwhogeschool in Wageningen, the Netherlandse Economische Hogeschool in Rotterdam and the Katholieke Economische Hogeschool in Tilburg.
The Act applies also to other institutions of higher education which are not universities.

(3) An authoritative committee established to advise the British Government upon the allocation of government funds to the universities.

PUBLIC AND PRIVATE UNIVERSITY EDUCATION

We shall now consider an application of the basic principles of university education in the Western world which is typical of the Netherlands and more than anything else has ensured that our university education is entirely in keeping with the national character. In dealing with the problem of the relationship between government or "public" education and private or "free" education Dutch legislators have practised the principle that all the diverse trends of thinking in our country should be respected.

The Dutch have always regarded religious freedom as a most important part of their heritage and down the ages the Netherlands has been a refuge for victims of religious persecution. The State of the Netherlands owes its origin to the "Eighty Years War" (1568-1648), in which religious freedom was the principal issue. A large proportion of the Dutch nation are very devout and want schools in which tuition is in conformity with the parents' conception of life. This right is recognized in the Constitution, but the provisions go further than that. Were the unkeep of such schools to be borne entirely by the pupils' parents, they would be paying for public education through taxation and again for the private schools attended by their children. The Dutch system is therefore based on the principle that private education, provided it meets certain standards, should also be subsidized by the Government. This is what is termed the "pacification" idea, laid down in the Constitution of 1917, and it provides fair treatment for the diverse trends of thought existing within the Dutch nation. The Government does not impose any definite ideologies upon education; on the contrary, it promotes the free development of different schools of thought.

Government responsibility for religious freedom is strikingly evident in the Dutch education laws. The new Higher Education Act is founded on recognition of the fact that public and private universities look after the interests of scientific training and research in the Netherlands equally well. It was primarily the acceptance of that principle, which reflects the actual situation in the Netherlands today, that determined the structure of the Act. Even more important than the structure of the Act is the provision that the Government shall guarantee equal opportunities of development for the public and private universities. For private institutions, the Government pays 95% of the net expenses "in so far as the university does not exceed what are considered in this country to be the standards of equipment and assets of a university". The remaining 5% is borne by the institutions themselves, or rather by the associations that established them. The freedom of the special institutions is emphasized by such private contributions which, in view of the enormous rise in the total expenditure of these universities (see annexes 7 and 8), mean a fairly substantial sacrifice.

Democratization of higher education

Students in the Netherlands are granted generous financial aid by the Government and also by provinces, municipalities and private institutions. The principal motive of these subsidies of the Government (which shoulders the main burden) is social justice - the ideal of equal opportunities.

At the end of the last century educational opportunities in the Netherlands were by no means as numerous as they are now. Owing to the very limited differentiation in the structure of education in those days, the high cost of education which parents had to bear and the fact that the advantages of a secondary education (following compulsory primary education) to say nothing of a higher education were little appreciated, opportunities for further development were virtually barred to many. Intellectual training and the intellectual professions were, in fact, reserved for the descendants of a small élite, and in other circles people were on the whole satisfied if their children were taught the three R's. Now it is almost generally agreed that wherever there is ability it must be developed. Present-day society demands the full cultivation of all available talent. Lack of money should never be an obstacle to study.

The application of the principle of social justice in this field has meant a step rise in the amount of government grants for study: the total amount allocated for higher education in 1950 was only 2,370,000 guilders, ten years later it had risen to 20,160,000 guilders. At present about 30% of students are in receipt of government grants of one kind or another.

The great advantages accruing from the cultivation of all the talent available cannot be measured merely in terms of services rendered to society; they are found in the first place in the value of the individual training itself. The young have a right to be educated for the sake of their own inner enrichment and because every one should be given an opportunity to develop his natural talents. Each will then be able to render valuable service to society, having gained an awareness of his social obligations and a sense of responsibility towards his fellow men.

The number of university students has increased rapidly in the last 50 years; in 1900 not quite 4,000 students were enrolled in the universities; in 1938, the last normal year before World War II, the number exceeded 12,000. In 1960 there were more than 40,000 students and in 1975 the number is expected to reach 66,000 (see annex 3).

However, the ideal of equal opportunity has not yet been attained. There are, for instance, many more male than female students - in 1960 33,000 male students as against 7,900 females - although the number of female students is gradually

increasing. In both secondary and university education the percentages of male and female students are not yet representative and among the working classes, only one quarter of those who, judging by their intelligence, could have gone to a university, are in attendance. Only about 8% of the male students are from the working classes, which is evidence that social factors must be taken into account and that the pursuit of education after compulsory education is still rare in certain working class circles. If full information were made available talented children from such circles could be helped to overcome that difficulty, and an extension of compulsory education from 14 years to 15 or 16 might also help to discover and stimulate latent talent. Such measures would, of course, call for increased financial aid, particularly in the field of secondary education.

It is thus evident, that education in the Netherlands still shows traces of the old social class divisions, but they are beginning to disappear here as elsewhere in the social structure. The ideal of equal opportunity, although it can never be fully realized, will always remain a goal in the further development of education. No policy can obliterate differences which spring ultimately from mankind's innate diversity. Nevertheless, developments in the Netherlands are such that anyone can receive the education appropriate to his abilities and talents, regardless of his financial status.

HIGHER EDUCATION AND SOCIAL AND ECONOMIC DEVELOPMENT

Since World War II important changes have taken place in the position occupied by the university in society. There have been far-reaching structural changes in the economic, social and cultural fields and these are reflected at the university level. The increase in the population, the maintenance of the high standard of living and the industrialization policy have all had an effect on the universities. After all, knowledge and education are in essence nothing but human life itself at a higher level of consciousness.

Knowledge and its application dominate the picture of society in the making. Before the war, when the revenue from industry was of less importance to the Netherlands than it is now, this fact was hardly realized. True, the Central Organization for Applied Scientific Research (Centrale Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, "TNO") had been set up in 1930 with the co-operation of government and industry, but conditions were not yet propitious. Now, deliberate industrialization is the backbone of Dutch governmental policy. If the Netherlands is to maintain a reasonable standard of living she is compelled to make efficient use of the nation's intellectual potentialities. Knowledge is no longer pursued for its own sake and not least among society's motives in promoting fundamental research is the hope of benefiting later from the results. Society gives science a free hand because freedom is vital to science, but society is particularly keen on applied science because of its effect on life in general. Nowadays no section of the community can do without science as a means of maintaining the powerful and complicated machinery of our modern society. There is continuous interaction between theory and practice and scientific discovery and practical invention are even more closely linked. Scientific research is being organized on an unprecedented scale, for science has become the dominant factor in the struggle for material prosperity. Obviously this new function of science will affect all education and in particular, higher education. The country with the best supply of trained scientific workers has the best chance of becoming materially prosperous. The bottle-neck in economic development in all countries is due to the shortage of scientific staff.

The Dutch Government is very much alive to these problems. In October 1961 the Central Bureau of Statistics (Central Bureau voor de Statistiek) published the results of an investigation of research and development work in the Netherlands during 1959(1). Even earlier two State commissions had completed an extensive investigation of the expansion of university education up to 1970(2)).

(1) Centraal Bureau voor de Statistiek. Speur- en ontwikkelingswerk in Nederland. Deel I. Onderzoek buiten universiteiten en hogescholen. Uitgeversmaatschappij W. de Haan N.V., Zeist, 1961.

(2) De spreiding van het hoger onderwijs tot 1970. Advies van de Commissie spreiding hoger onderwijs en van de Commissie spreiding technisch hoger onderwijs. Staatsdrukkerij, 's-Gravenhage 1960.

CHAPTER II

EXPANSION OF HIGHER EDUCATION AND RESEARCH

SCIENTIFIC RESEARCH

The Netherlands really began to recognize the increasing importance of science only after the war when the work of the Royal Dutch Academy of Sciences, the highest authority advising the Government on science, was expanded. In 1950, the Netherlands Organization for the Advancement of Pure Research (Nederlandse Organisatie voor Zuiver Wetenschappelijk Onderzoek, ZWO) was set up; its terms of reference were to encourage pure research, in particular by means of grants for which the Organization receives a substantial government subsidy. Numerous other research institutes were also created, such as the Foundation for Fundamental Research into Matter (FOM), the Foundation for Radio Astronomy, and the Foundation for Chemical Research, to mention only a few. The enormous increase in the budget estimates for university education and the various research institutes testifies to this post-war growth.

The problems connected with the expansion of research do not involve simply the quantity of research work to be done, but the determination of what direction research work would take. The questions concern matters of research and economic policy, the various categories of research to be undertaken and for what sectors of society research is to be carried out.

In the publication of the Central Bureau of Statistics mentioned earlier[1], an attempt has been made to give a clear definition of research and development work and to establish a systematic differentiation. Although a rough estimate of research done at universities has been included in the figures, the investigation does not take into account research carried on in these institutions. These were published in volume II which appeared at the end of 1962 and results of similar investigations abroad are also given.

Volume I was restricted to research being done in the field of natural sciences, including the medical and technical sciences. Expenditure on research in the field of the "alpha sciences" will be relatively low, however, since these are by nature less costly than the natural sciences.

The total amount of money spent in the Netherlands in 1959 on pure and applied research, including development work in these fields, is estimated at about 550 million guilders[2]. In 1947 the estimates were from 30 to 35 million guilders and in 1951, 165 million guilders - although these are not altogether comparable. Pending the results of the investigations conducted among the universities, an estimated 50 million guilders has been included to cover research at universities, and about 30 million guilders to cover research abroad (participation in international scientific projects and organizations like EURATOM, CERN, etc.).

Thus, in 1950 in the Netherlands, more than 1.6% of the net national income was spent on research as against an estimated 0.3% in 1947 and 1% in 1951 (and 1955). These figures relate, of course, to civil research.

The following table shows the allocation of the 550 million guilders according to the places where the research was done.

	Guilders in millions
Abroad	30
At universities (provisional estimate)	50
By industrial undertakings	336
By other private undertakings	8
At institutes of the Organization for Applied Scientific Research in the Netherlands	70
At other research institutes	56
	550

In order to obtain a picture of the total scientific effort for industrial development, the sum of 336 million guilders spent on research by industrial undertakings should be augmented by expenditure on research work by, for instance, the Institutes for Applied Scientific Research (TNO), for the purchase of patent rights, etc.; this raises the total to 366 million guilders. The statistical publication gives a differentiation both according to the size of the enterprises involved and the different branches of industry. Classification, according to the size of the undertakings, shows that 93% of the research was done by concerns with a staff of more than 200, 5 large concerns having done the lion's share of the work. Broken down according to branch of industry, research outside these "Big Five" was concentrated in three fields: the chemical industry, the metal industry and the foodstuffs and luxuries industry.

(1) Speur - en ontwikkelingswerk in Nederland.
(2) 1 guilder = $0.28

Of the 70 million guilders spent on applied scientific research within the framework of TNO and the 56 million spent on other research institutes (such as the Netherlands Reactor Centre, the Royal Netherlands Meteorological Institute, the Central Institute for Brain Research, etc.), 32% was spent in investments and 18% on industrial research. Consequently, the volume of research can be expected to increase considerably here. As much as 45% of this research was in the field of industrial application and was therefore also of benefit to industry. Furthermore, 20% was related to agricultural research, 20% to research in the field of the natural sciences and 7% to medical research. Fundamental research predominated, particularly in the latter two branches.

Of the 470 million guilders that remained after deduction of 50 million for research at universities and 30 million for research abroad, about 95.5 million was furnished by the Government, 2.7 million came from abroad and the rest from industry and private enterprise. The Government grant is particularly important in the case of the institutes of the Organization for Applied Scientific Research and the group of other research institutes; these grants made directly or indirectly (for instance through the Organization for the Advancement of Pure Research (ZWO)), amounted to as much as 70%.

These figures relate to pure and fundamental research and applied scientific research combined, since it was impracticable to separate the two branches. Generally speaking, however, pure and fundamental research is more likely to dominate at universities, and frequently also at research laboratories outside the Organization for Applied Scientific Research, than at industrial laboratories and applied scientific research institutions. Consequently, pure research in the Netherlands depends to a great extent for its finances on the Government which either pays for the universities or pays in full or in part for the various research laboratories.

It is clear from the foregoing how important it is that statistics should be differentiated. This has been done properly for the first time in this difficult field by the Central Bureau of Statistics. The forecasts thus established for research at universities may serve to indicate fields of research at universities that are still "underdeveloped". However modest the sum of 50 million guilders may appear, it is of paramount importance for here more than anywhere else pure research dominates. Scientific research is essential to the life of universities, and they are the most appropriate places for pure research, although this does not mean that research should not also be done elsewhere. The rapid expansion of fundamental research at industrial and extra-university laboratories in the Western countries, has diminished the contribution of the universities to research in the field of the natural sciences. Pessimists believe that this process will go much further so that in the long run the physical, chemical and biological laboratories at the universities may become little more than training institutions.

Such a development would, of course, be fatal, for it is this very combination of teaching and research which should typify university life. The trend must therefore be watched, but the fear that it may go too far need not be too great, because pure and fundamental research is only partly capable of being taken over by industrial and other laboratories, which differ essentially from university laboratories. Whereas in industry the consideration of ultimate usefulness always plays a part, even in fundamental research, the university researcher is not only formally free, but free in the full sense of the word, to choose his subject of research. For instance, he may devote his entire scientific life to the study of fleas or to the synthesis of all the isomers of $C_{12}H_{26}$ without ever having to justify his choice of topic to others. This freedom has led to surprising discoveries and ingenious theories, although mediocre results are also an unavoidable consequence.

A good science policy should aim at establishing a balance not only between the sciences themselves, so that one branch of science does not grow at the expense of the others, but also between pure and fundamental science, applied science and training. Staff shortages and often the high cost of scientific equipment make it imperative to establish that balance and to use the available means wisely.

Various factors have given rise to a development in the direction not only of the assignment of particular subjects to particular universities, but also to closer inter-university co-operation through the establishment of inter-university institutions. Examples of the former are the concentration of studies for civil engineering, architecture and naval architecture at the technological university at Delft and the concentration of studies in oriental languages at Leyden. Examples of the latter are the Inter-University Reactor Institute at Delft, where studies of reactor physics are concentrated, and the Inter-University Marine Research Institute at Den Helder where the universities have pooled their marine-biological research.

For the same reasons the relationship between research in the Netherlands and participation in international research projects will have to be reviewed. The ever rising cost of research in certain fields and the necessity of making the utmost of the available staff are compelling arguments in favour of international co-operation. The Netherlands is convinced that this is the proper course and it has therefore participated fully in CERN and EURATOM in the fields of theoretical nuclear physics and nuclear energy. The Netherlands is also taking part in two European organizations set up this year for co-operation in the fields of space research, the European Space Research

Organization (ESRO) and the European Laufficher Development Organization (ELDO). In addition to such multilateral scientific co-operation, bilateral co-operation has been established with Belgium in the field of radio astronomy for the construction of a giant cross antenna and with Norway in the field of nuclear energy. International co-operation in organizations such as the Council of Europe, Unesco, OECD and NATO is, of course, also important.

However, in all these cases international co-operation needs proportionate national backing. Participation in CERN and EURATOM, for instance, is backed by research undertaken at Dutch universities by the Foundation for Fundamental Research into Matter, the Netherlands Reactor Centre, etc. The decision to participate in international space research was prompted by the hope of giving added impetus to the national effort in that field. Similarly, co-operation in the cross antenna project resulted from the experience gained by the Foundation for Radio Astronomy with the radio telescope at Dwingelo.

In farming policy careful consideration should, however, be given to the kinds of co-operative effort in which the nation should participate, so as to avoid placing too great a strain on the manpower and financial resources available for scientific projects.

Foreign students and research workers can benefit from what is being done in the Netherlands and the universities co-operate in this work through the Netherlands University Foundation for International Co-operation (NUFFIC). The Institute of Technology at Delft, for instance, organizes international post-graduate courses in hydraulic engineering and sanitary engineering. The International Training Centre for Aerial Survey (ITC), also at Delft, attracts students from all over the world and the Institute for Social Studies at The Hague offers a number of international courses in public administration, social welfare, etc. The Agricultural University at Wageningen has also organized some international courses.

Higher education

Since the end of World War II, the universities have developed gradually and have been able to adapt smoothly to conditions without seriously affecting either the steady growth of science or the number of students. They are now confronted with quite a different situation as a consequence of the great increase in the number of students, the accelerated rate at which science is developing and the need to meet society's demand for a much greater number of university graduates.

In order to meet these requirements two new medical faculties were established in the first ten years after the Second World War at the private (Protestant) university, in Amsterdam and the Roman Catholic University, in Nijmegen. Under the auspices of the medical faculties in Leyden and Utrecht, a medical school, the "Stichting Klinisch Hoger Onderwijs", was established at Rotterdam for students preparing for the final examination, after their "doctoral examination" (which approximates to the master's degree). Nijmegen University was given a faculty of mathematics and physics and large-scale provision was made to extend and modernize existing faculties. The most important measure was perhaps the foundation of a second technological university at Eidenhoven in 1956.

There was however a growing conviction that the problems connected with the necessary extension of scientific training should be tackled more systematically. In 1954 the Central Bureau of Statistics published Herziene berekeningen omtrent de toekomstige loop der Nederlandse bevolking 1951-1981 (Revised projection of population trends in the Netherlands 1951-1981), and one year later the Central Planning Bureau drew attention to the rapid growth in the anticipated demand for physicists and skilled technicians in its publication En verkeumig der economische toekomst mogelijk heden van Nederland 1950-1970 (Assessment of the economic prospect of the Netherlands 1950-1970). In 1956, the Central Bureau of Statistics in co-operation with the Central Planning Bureau and the Ministry of Education, Arts and Sciences, published Berekeningen omtrent de toekomstige om vang van het Nederlands hoger onderwijs en de aantallen afgestudeerden 1956-1970 ("Forecasts on the development of Higher Education in the Netherlands and of the number of graduates 1956-1970"). The Central Bureau of Statistics based its calculations mainly on forecasts of the growth in population and on the probable effect of the post-1945 increase in the birth rate on the development of university training. The anticipated expansion of secondary education, which is the main avenue of approach to university training, provided the Bureau with a starting point. Account had to be taken not only of the consequences of the increased birth rate but also of the fact that in the rural districts the number of secondary schools was growing so that the backlog was being made good and an ever-growing interest was being taken in secondary education. The conclusion reached was that in the period 1955-1970 the number of students could be expected to double under the influence of these factors.

The population trend can best be illustrated by the increase in the number of the average generation of 18 and 19 year olds, the most normal age for admission to university education. Whereas the average generation reached 146,000 in 1930 it will have risen to 261,000 in 1965. In consequence of the high birth rate in the post-war years, the peak year may be expected to be followed by stabilization at about 220,000 in the years 1970-1985, as compared with about 160,000 in the period from 1940 to 1955. The year 1985 will be followed by another rise as an echo effect of the 1946-1947 birth rate peak, that is to say

when the children of the present generation have, in their turn, reached the age for university entrance. A graph of this trend is given in Annex 1.

Since the number of pupils admitted to secondary education has risen in recent years from 9% to 14% of the respective generation, the percentage of first-year students from the generation of 18 and 19 year olds is also expected to increase. It should be remembered that in the Netherlands anyone holding the appropriate secondary school certificate is entitled to sit for university examinations and the universities do not demand any further selection before admission.

In its 1956 report the Central Bureau of Statistics gave the following estimate of the number of first-year students and of the total number of students for 1956-1970.

Year	First-year students	Total number of students
1956-57	4,900	29,200
1957-58	5,200	29,400
1958-59	5,400	30,100
1959-60	5,800	31,300
1960-61	6,200	33,000
1961-62	6,900	35,200
1962-63	7,300	37,700
1963-64	7,400	39,800
1964-65	8,700	43,100
1965-66	10,100	47,200
1966-67	9,600	50,200
1967-68	9,100	52,400
1968-69	8,700	54,000
1969-70	8,700	55,100
1970-71	8,700	55,900

These figures have since proved to be too conservative. The total number of first-year students for the academic year 1961-1962 is not 6,900 as estimated, but 8,125, and the total number of students is not 35,200, but 43,669 (see annex 5).

Clearly a long-term policy had to be devised to deal with the influx of students and to prevent university training from encountering very serious difficulties. The Minister of Education, Arts and Sciences appointed two commissions to advise on future policy, particularly with a view to forecasting the increase in the number of students. These two commissions, the Commission for the Expansion of University Education (July 1957) and the Commission for the Expansion of Higher Technical Training (April 1958), submitted a joint report in October 1959.

The report approaches the problem from two angles, that of the influx, i.e. the anticipated rise in the number of students applying for university training, and that of the national demand for university graduates. By comparing supply and demand, the number of students expected for the various faculties in the next 10 or 20 years can be forecast. Such long-term estimates, of course, are only of relative value, and it is of the greatest importance that they be checked continually against actual development and that the investigations be kept up to date and policy corrected in consequence.

The Commissions worked on the principle that everyone desiring to receive university training and holding the necessary certificates or other qualifications, should continue to have the opportunity to do so.

In the interests both of the students and of the nation, the scope of the national demand for graduates per faculty needed to be investigated and a separate, highly expert commission, the Commission for Statistics of the "Interuniversitair Contactorgaan" (the forerunner of the Academic Council which will be dealt with in Chapter III), conducted the necessary investigations in close co-operation with the Central Bureau of Statistics and the Central Planning Bureau. The results appeared in a report entitled "The growth of the number of university graduates until 1980. Supply and Demand". (De ontwikkeling van het aantal academici tot 1980. Aanbod en behoefte. Uitg. Mij. W. de Haan N.V., Zeist, 1959).

The need to improve the efficiency of the university system in order to meet the rapidly growing demand for opportunities for study and adapt it to its changing rôle was one of the strongest reasons for the enactment of the new Higher Education Act.

In 1965 (the year in which the two Commissions on expansion were appointed), the Minister of Education, Arts and Sciences in consultation with the Ministers of Finance and of Reconstruction and Public Health had an initial assessment made of the consequence of the expected increase in the number of students up to 1970 with regard to accommodation requirements. At a rough initial estimate, it was then thought that the anticipated doubling of the total number of students would call for an investment of some 200 million guilders for building and equipment. The estimate allowed for the existing backlog, necessary replacement and new housing for students. It was decided that the individual universities should draw up plans forthwith for additional accommodation to meet the expected increase so that the necessary sites and buildings would be available.

On the basis of the provisional plans submitted by the universities, the Minister of Education, Arts and Sciences prepared a provisional investment scheme for higher education covering the period 1959 to 1970. A sum of approximately 1,500 million guilders was considered to be a reasonable starting point for the university education expansion scheme up to 1970. As the preparation and the initial stages of these plans would necessarily take much time, the Minister pointed out that, although he was prepared to start with an average investment of 150 million guilders per annum, the full amount would not be needed for the first year but would probably be exceeded in subsequent years.

The facts have proved him to be right. Investment in establishments of higher education in 1962 amounted to over 150 million guilders, and in the years to come further rises are to be expected. Indications are that even the very first rough estimate of 200 million guilders as the total required will probably be exceeded now that the university expansion plans are beginning to take shape.

The expansion Commissions have done their work in close co-operation with the universities. For instance, the "Interuniversitair Contactorgaan" formed inter-university working groups of professors for the various branches of study to advise on the quantitative and qualitative aspects of the problems concerned with the expansion of higher education. As the work of the Commissions progressed, a number of sub-committees were set up to prepare preliminary reports on certain questions such as the maximum capacity of a technological university, the regional aspects of expansion, the possibility of combining basic training in the natural and the technical sciences. The preliminary reports of the sub-committees are attached to the main report.

The two Commissions regarded it as fortunate that according to forecasts the number of students will double, for this is necessary if the anticipated demand for graduates is to be met. Taking as a basis an increase in the number of graduates per 10,000 inhabitants of from 44 in 1955 to 62 in 1970 and 76 in 1980 (see annex 2), it was found that the number of students would increase to 60,000 or 66,000 around 1975, i.e. more than twice the 1956 figure and considerably in excess of the figure calculated in 1956 by the Central Bureau of Statistics for the year 1970, i.e. 56,000.

The Commissions, however, emphasized that for periods of varying duration more or fewer students than the nation required might graduate from certain faculties. If the choice of study of first-year students were to be brought into line with the anticipated increase in the demand for graduates, a considerable shift would have to take place (see annex 4). Sound information on the country's anticipated demand for graduates continuously adjusted to tally with actual developments, might help to bring the supply into line with demand. The influx of students into those branches of study in which the demand is greatest, the technological and natural sciences, could also be stimulated by introducing changes in the present pattern of branches of study offered, i.e. by offering courses in those studies at more universities than hitherto. The inclination of the Dutch student to pursue his studies as near home as possible accounts in part for the pronounced regional character of Dutch universities, which appears to affect the choice of faculty. Although compared with those in other countries the distances are short in the Netherlands; unless the student-to-be has a definite preference for a certain faculty, the distance between his residence and the universities available to him will usually determine his choice of institution.

The Commissions held the view that the training capacity of universities should be increased, primarily by improving and extending the capacity of the existing universities. A further expansion could only be considered in so far as the anticipated increase in demand included students who would be deprived of a university training for lack of regional institutions. The provisions to be made for this purpose could also take into account the changes in the present pattern of disciplines necessitated by the increasing demand. No new institutions of university education were to be established unless they were absolutely essential.

On educational grounds, the Commissions were against the establishment of independent training facilities for students preparing for the first (candidate) examination. This examination is in a certain sense comparable with that in the colleges in the United States and qualifies the student for university entrance. The Commissions thought that regional interests were never of sufficient importance to outweigh the educational objections.

The Commissions stressed the fact that the important part played throughout the world by technology and natural sciences and also the promotion of industrialization in the Netherlands made it imperative that the greatest possible attention be given to increasing the training facilities for these two faculties.

Technological training facilities should preferably be expanded by organizing new courses comprising the three principal branches of study: mechanical engineering, electrical engineering and the technology of chemistry, for these together attract 60% of all technical students. The Commission for the Expansion of Higher Technical Education proposed the establishment of two new (technological) universities, one in the east and one in the north west, near Amsterdam, in order to meet the requirements. The establishment of a fifth technological university (in the south west) might prove to be necessary after 1970.

As regards the natural sciences, the Commission for the Expansion of Higher Technical Education favoured a limited expansion of training facilities for the faculties of mathematics, physics and chemistry, which might lead to a much needed stimulation of public interest in those branches of study. The Commission did not recommend, however, the establishment of a new faculty of mathematics and natural sciences in addition to the six already in existence, but was in favour of offering courses in pure mathematics, physics and chemistry at the technological university at Eindhoven. This idea, which is new to the Netherlands, would be the counterpart of the experiments being conducted at the State university at Groningen where, in addition to pure scientific training, courses have now been organized in applied mathematics,

physics and the technology of chemistry. The Commissions also recommended the introduction of training for the first (candidate) examination in pure mathematics, physics and chemistry at the technological university at Eidenhoven, and at the new university to be established in the east. This would encourage students to enter these branches of study and at the same time broaden the pattern of studies from which they might choose.

The structural changes in society have of course had a great influence on the development of the services sector, so that the demand for graduates in the social sciences, i.e. law, economics, social sciences and psychology, is also expected to show a steep upward curve. However, the demand for trained personnel from these branches of study will not increase to the same extent as for graduates in technology and science. Adjustment of the training facilities at short notice to the increase in this demand can be realized at less expense and with less building than for technological and natural science faculties. Even now, however, more than 25% of all new students choose these branches of study, outnumbering the total number of students taking up mechanical engineering, electrical engineering, the technology of chemistry, mathematics, physics and chemistry. But in the opinion of the Commission for the Expansion of University Education there are other factors that, to a certain extent, and regardless of the quantitative aspect, make a limited expansion of the social sciences desirable. The Commission refers to the growing interdependence of these sciences, particularly of economics, law and sociology, and also of these sciences and technology. On these grounds the Commissions recommended that a faculty of law and a course in sociology should be included in the curricula of the Nederlandse Economische Hogeschool at Rotterdam and the Katholieke Economische Hogeschool at Tilburg. They also recommended the establishment in the east of a new type of university offering social sciences, and in accordance with the aforementioned recommendations, technology and training for the first examination in mathematics, physics and chemistry.

The Commission for the Expansion of University Education considered the training facilities provided for the medical faculty adequate to meet the anticipated demand for medical graduates. After the second World War the training facilties were, in fact, extended by including medicine in the curricula of the free (Calvinist) university at Amsterdam and the Catholic university at Nijmegan, and by the establishment of special training facilities under the Stichting Klinisch Hoger Onderwijs at Rotterdam.

The Commission considered that dental training called for expansion. The total training capacity of the dental departments of the medical faculties at the State universities at Utrecht and Groningen was not considered sufficient for the training of a sufficient number of dentists to raise dental care in the Netherlands to a reasonable level. In addition to doubling the training facilities in Groningen, the Commission recommended that a department of dentistry should be added to the medical faculty of the Catholic university at Nijmegen and, taking a long-term view, that a fourth dentistry department be established at Amsterdam after 1970, if possible under the auspices of the two Amsterdam universities.

The Commission did not think extension of the training facilities for the arts faculties justified. Most graduates in these subjects are destined for teaching posts in secondary schools. Immediately after the war, training facilities for secondary school teachers were enlarged to meet the expected growth of secondary education resulting from the post-war increase in the birth rate. In view of the fact that this increased birth rate will shortly cease to affect the secondary schools, and that no significant growth of secondary education is to be expected, a surplus rather than a shortage of teachers in some disciplines is expected within the near future.

Having heard the advice of the universities and other institutions concerned on the report of the expansion Commissions, the Minister of Education, Arts and Sciences submitted to the Second Chamber of the States-General on 25 January 1961 an exhaustive memorandum on the expansion of higher education (Nota inzake de uitbreiding van het wetenschappelijk onderwijs). In the memorandum he explained the short and long-term measures to be taken for the expansion and improvement of higher education. The Minister stressed even more than the Commissions could do in their report all the problems with which the Government will be confronted when university education is extended in the years to come. In addition to a number of concrete proposals based on the advice of the expansion Commissions, the memorandum contained detailed accounts of the aims and objects of university education, the task of the Government in regard to the universities, the structural changes in university education, inter-university co-operation, the assignment of particular subjects to particular universities, etc.

As regards the recommendation of the expansion Commissions to the effect that a new type of institution be established in the east of the country, the Minister held the view that for the time being the introduction of a proposal to establish a technological university in that region would have to suffice. In the meantime, Parliament passed a Bill on 21 November 1961 amending the Higher Education Act and including the third technological university. This university which is to be established near Enschede is intended primarily for the training of mechanical, electrotechnical and chemical engineers. Preparations for the setting up of the technological university are now in full swing and special attention will be given to fitting the social sciences into the curriculum without, however, establishing a separate

faculty for these sciences. The institution is expected to open its doors to the first batch of students in September 1964. It will differ in yet another respect from existing institutions, for it is intended to introduce a type of housing for students new to the Netherlands. This new system, known in Britain as the "residential system", is to serve a double purpose, in the provision of housing accommodation and character-building. The institution is to be the first "campus" university in the Netherlands.

In principle the Minister was agreeable to the establishment of a fourth technological university in the vicinity of Amsterdam, but the opening date will have to be deferred owing to the shortage of scientifically trained staff.

The Minister is also, in principle, agreeable to the tentative introduction of pure scientific branches of study in mathematics, physics and chemistry at the technological university at Eindhoven, and of experimental joint propaedeutic training in these branches of study and the applied scientific studies at both the technological university at Eindhoven and the new institution at Enschede.

The Minister adopted the suggestion that faculties of law be established at the Nederlandse Economische Hogeschool at Rotterdam and the Katholieke Economische Hogeschool at Tilburg. A Bill for the amendment of the Higher Education Act is shortly to be presented to the States-General. In the meantime, the addition of sociology also proposed in the report on expansion, became possible when the Second Chamber, dealing with the Higher Education Bill, passed an amendment to the effect that both of the above-mentioned institutions should also have a faculty of social sciences.

The proposals adopted by the Minister to double the training capacity of the department of dentistry at the State university of Groningen and to arrange for dental training to be available at the Roman Catholic university at Nijmegen have been carried into effect. The Minister also agreed in principle to the establishment of a fourth dental training centre at Amsterdam which would be operative a few years after the establishment of the training centre at Nijmegen, i.e. even earlier than had been foreseen in the report on expansion.

Concurring with the expansion commission, the Minister also rejected the regional demands that independent propaedeutic training facilities be provided.

The estimated investment called for by these measures was based on the estimate of 1,500 million guilders spread over ten years for the whole of university education. The cost of building the third technological university is estimated at 150 million guilders and is included in the amount quoted. The calculation of the total sum is based on the estimate that the investment required per student will be 15,000 guilders for the arts faculties and from 60,000 to 75,000 guilders for the science faculties.

Since the allocation for the new technological university at Enschede will be only 10% of the total amount required, it is evident that the Government and the expansion Commissions alike take the view that the expansion of the training capacity of the universities should be achieved in the first place by improving and extending existing universities.

The comparative tables in annexes 5 and 6 of the number of students (total figures and number of first-year students in the academic years 1955-1956 and 1961-1962, according to university and faculty) illustrate the rapid rise in attendance of the universities in recent years. Obviously very substantial sums will have to be invested in the existing universities if they are to handle the anticipated influx of students properly.

The summary of the amounts invested in the various institutions since the war given in annexes 7 and 8 clearly shows the steep rise.

Large sites had to be earmarked for the expansion schemes. Each of the three State universities, for instance, now has at its disposal a site of from 40 to 80 acres outside the town. The Catholic university at Nijmegen has acquired a site of 32 acres and the technological universities at Delft, Eindhoven and Enschede also have large sites. The municipal university of Amsterdam, however, preferred to keep its institutions in the city proper and to concentrate them in three places. Like the free (Calvanist) university of Amsterdam, it has a much smaller site.

The total sum of 1,500 million guilders that has been mentioned repeatedly includes investments in extra-university scientific establishments and institutions.

A substantial proportion of this sum has been earmarked for facilities and utilities for students such as housing, sports and catering. The greatest problem is still to find suitable accommodation for the ever-growing influx of students, the traditional Dutch system of renting private rooms being no longer practicable. Before 1970 additional accommodation will have to be provided for about 15,000 students and the work has already started with backing from the Government and business circles. New blocks of flats for students are being erected and houses are being purchased for alteration as suitable student accommodation. Appropriate student bodies have been set up to administer the housing facilities thus made available and which amount to a total space of 3,000 rooms.

Government grants for student sports facilities also date from after the Second World War. In 1958 a sports centre and sports hall were built for the technological university at Delft with financial assistance from industry. In 1961 it was decided that the Government was to bear the costs of sports accommodation for all the universities, both public and private. The plans are now ready for the majority of the institutions and are shortly to be realized.

The general "Mensae" set up after the war where students can have a good meal at a reasonable price have also become an institution in Dutch university life. The Government bears 50% of the cost of certain establishments run by students' organizations and the total cost of general catering establishments unconnected with any students' organization.

Annexes 7 and 8 give an idea of the total expenditure on higher education in the Netherlands in recent years. It should also be noted that capital investment foreseen in future years will entail a considerable increase in current expenditure.

Such expansion of higher education is not of course possible without a considerable increase in staff. The number of professors in the faculties of law and medicine at the three State universities has doubled since 1940. The number of professors in the faculties of mathematics, natural sciences and the arts has more than doubled and the situation is very much the same at the technological university at Delft. It is especially remarkable that the increase of scientific staff kept pace with that of the student body and was considerably larger than that of the number of professors. Good professors and scientific staff are very difficult to find particularly when a smaller generation has to train a larger one. The problem becomes even more complex as a result of the heavy demands made on that smaller generation by industry, which is also in the process of development. Thus far, however, the universities have always succeeded in meeting their increasing need for scientific staff fairly satisfactorily, but problems of staffing loom large, and are being tackled systematically. Indeed certain departments of the universities have already taken on sufficient staff to cope with the anticipated influx of new students in the next few years.

CHAPTER III

LEGAL PROVISIONS

Autonomy and unity

The Higher Education Act of 1 January 1961 was designed to give the universities the opportunity of adjusting their organization and development to modern needs in the field of higher education and science.

Provident minds had already realized during the war that higher education would have to play a leading part in the post-war world. Moreover, the experience gained during the war years had shown all too clearly the dangers that threaten higher education when the State uses it for its own purpose. The problem was, therefore, how to achieve the maximum efficiency of organization consistent with the degree of freedom that higher education and research require if they are to flourish.

The universities' desire for autonomy was growing, partly as a result of the pressure of enemy occupation. The concept was formed of a universitas neerlandica which was to symbolize the autonomy of higher education as a whole. It was to be invested with administrative powers and would distribute the subsidy that the Government would pay it in a lump sum among the individual universities.

Unfortunately the idea did not materialize. However, the new Act does acknowledge the idea of greater autonomy and of higher education as an entity, and it is thus incumbent upon the Government to ensure that equal opportunities for development are provided for both the public and the private universities.

As regards autonomy there is a historical difference between the public universities and the private institutions. In principle anybody is entitled to establish an institution for higher education in the Netherlands and, as long as they do not ask for a Government subsidy, such institutions may remain completely autonomous, except, of course, as regards the standards that the Government must impose concerning the quality of the examinations if an institution wishes its examinations to be given effectus civilis. The Vrije Universiteit, founded at Amsterdam in 1880 and subsidized since 1948, was a long-standing example of such an institution. At present there are no unsubsidized universities whose examinations are equivalent to those of the State institutions.

When, after the war, it was decided that the private institutions should also be subsidized, a system had to be devised that would enable them to maintain their freedom while accepting a Government subsidy. The legislature tried to achieve this through a scheme for subsidies in which the sums spent by the public universities were taken as standards for the subsidies to the private ones. Provided the subsidy did not exceed the standard figure, the Subsidy Act of 1948 provided for a certain grant towards the university's net expenditure, the remainder (initially 35%) being borne by the institution. Since part of the cost was to be borne by the universities, they were forced to be economical.

The struggle for greater autonomy applied only to the public universities. One of the most important principles of the new Act is that under it the State universities at Leyden, Groningen and Utrecht and the municipal university at Amsterdam are regarded as corporate bodies with a certain degree of autonomy. The technological universities at Delft and Eindhoven acquired similar status in 1956. When the introduction of that reform was being contemplated, the question was not whether autonomy was desirable, but how and to what extent it should be granted. It was realized from the start that an autonomy such as that of the British universities would not suit our system and that the Government should continue to keep a certain control over the autonomous public universities.

Have the legislators succeeded in dividing the responsibility of university and Government fairly? From a dependent branch of the Government Service, the "new style" university has become a corporate body and its Governing Board has been granted new powers. Under the provisions of the Act, the Board of Curators is in charge of university buildings - no small matter in present-day universities with their numerous laboratories and institutions and their big expansion schemes. The Board also appoints the entire staff, except the professors and readers who are appointed by the Crown. Every year the Board draws up the financial plan and sets the budget. In addition, it prepares a development scheme every four years in which the future policy is set out as regards scientific research and training.

The powers of the university are subject to government restriction. The university may pursue its own building policy but the actual plans require ministerial approval as does the budget. As regards staff policy, the Board of Curators is obliged to observe the provisions which the Crown has laid down concerning the legal status and salaries of university personnel.

Another important feature of the new Act is the principle of equal opportunities for development for public and private universities. This principle is based on the recognition that the interests of higher education and research can be entrusted equally well to public and to private universities. Accordingly, the procedure followed in all previous education acts whereby regulations for public education were given first, followed by a few provisions concerning private education, has been abandoned. In the new Act the common provisions applicable to public and also to private universities have been brought together, albeit with certain differences.

The acceptance of the principle that private universities contribute to national development and are therefore entitled to the same opportunities as public institutions, has extremely important financial consequences. The Act guarantees equal opportunities of development for private universities by providing that the Government shall contribute 95% of the net expenditure, i.e. of the difference between income and expenditure. This contribution towards the net expenditure is granted "in so far as the university does not exceed what are considered in this country to be the standards of equipment and assets of a university". If the net expenditure of the private university exceeds that standard, the Government shall contribute "in so far as such expenditure in the opinion of our Minister (i.e. the Minister of Education, Arts and Sciences) is compatible with the general provisions made for science and higher education". Thus, according to the new conception, subsidies to public universities no longer set the standard for subsidies to be granted to private institutions. Henceforth the standard is to be determined by the equipment and assets of both public and private universities. Clearly, this standard will change according to what is deemed to belong to "equipment and assets" and what is deemed to conform with "the entity of provisions for science and higher education". Consequently the application of the new regulations will be based on consultations between the private institutions and the Government in a spirit of mutual trust. As a safeguard against arbitrary action on the part of the Government, the Act gives the private institutions the right to appeal to the Council of State.

The free (Calvinist) university at Amsterdam and the Catholic university at Nijmegen which are, at present, engaged in organizing the most costly faculties: medicine and mathematics and physics, are, in particular, benefiting from the government subsidy, 19 out of every 20 guilders, or 95% of the cost, being furnished by the State.

The remaining 5% is borne by the private universities themselves, or rather by their founding associations, this contribution being regarded as a guarantee of freedom. The 5% may, however, mean rather heavy financial sacrifice, in view of the enormous increase in total university expenditure.

Both public and private universities are required to submit a "financial plan" to the Minister of Education, Arts and Sciences every year, giving an estimate of expenditure for the four years following the budget year. The estimates must, of course, be based on the development scheme, and may be more exact for the first and second years than for the third and fourth years. Since a financial plan must be submitted every year, estimates "move up" a year at a time, making it possible to adjust the figures, the estimates for a new year being added annually.

In order to make full and continuing provision for university requirement, the new Act provides that the Minister of Education, Arts and Sciences and the Minister of Finance, upon receipt of the four-year financial plans drawn up by the universities, shall prepare a general financial plan for the universities and submit it to the States-General, together with the development and financial plans received from the universities. Thus, the Act contains a basic provision which makes it possible to consider the expansion of higher education, both public and private, against the background of what must be deemed necessary in the general interest. Since the preparation of development schemes must precede the preparation of financial plans by the universities and since further experience in the preparation of such four-year financial plans is needed, the Ministers have not yet drawn up a general financial plan for submission to the States-General, although they have prepared a limited financial plan for the technological universities, which have been required to submit annual four-year financial plans every year since 1956. However, all the universities are now engaged in drawing up development schemes and four-year financial plans.

Another reform introduced by the new Act, the establishment of the Academic Council, is evidence of the tendency to regard higher education as a single entity. As stated in the Act, the Council is intended to form a link between the various Dutch universities and between the universities and the community. It encourages co-operation between the Dutch universities and the adaptation of higher education to the development of science and the national requirements. The Academic Council consists of a chairman appointed by the Crown from a short list drawn up by the Council, two members from each of the universities (one of whom is appointed every year by the Senate and the other by the Board of Curators) and ten members appointed by the Crown. The forerunner of the Academic Council was the "Interuniversitair Contactorgaan" through which body the universities had co-operated on a voluntary basis since 1956 to consider their common problems and to prepare the ground for appropriate legislation. A Council for Technical Higher Education to promote co-operation between the two technological universities was also set up under the Higher Education Act of 1956.

The establishment of the Academic Council was closely associated with the granting of a certain degree of autonomy to the public universities and the introduction of the system of equal opportunities of development for both public and private higher education. It was obvious from the outset that a co-ordination of effort from an overall national point of view in respect to the development of higher education was indispensable. At the same time the Government accepted the principle that each university should have internal responsibility for its contribution to the total effort.

Each university can cover only part of the total field of the sciences. The shortage of scientifically trained manpower, the limited means available and the necessity of linking up each scientific contribution with all the others make co-ordination a matter of the greatest urgency. Only in this way can the universal character of science be preserved, given the present trend towards specialization.

Fortunately the necessary co-ordination can, for the most part, be effected by the university world itself. The new Act asks the universities to reflect on the general aspects of their policy every four years and to embody their conclusions in a development scheme. The schemes are sent not only to the Minister but also to the Academic Council which considers them as a whole and advises the Minister accordingly. The development schemes, which are intended to describe in broad outline the developments anticipated by each university in the near and distant future, must also be considered as a whole to see whether they fit into the total framework of the provisions for science and higher education. Demands may be excessive or there may be undesirable duplication or gaps that need to be filled. Higher education as a whole must adapt itself continuously to the development of science and to the nation's needs.

In view of the very difficult decisions to be taken on policy in the field of higher education, including the adaptation of education to the country's needs, it may prove to be of great help to the Government to be able to consult a single body that can be regarded as the "spokesman" of higher education in the Netherlands. Since the Academic Council has only just begun to function, the position it will occupy in the future is not yet certain. Within the framework of legal provisions concerning autonomy and unity, however, the Council has been entrusted with an important function as an organ of consultation for the universities and as an advisory board for the Government.

Required educational standards

Since the aims of higher education also include the preparation of men for positions for which scientific training is required or may be useful, it follows that the Government should guarantee the quality of that training. Consequently the Government should have at least some control in the matter of study programmes and standards, as well as in the organization of university education. In its own interest and in that of the community, the Government cannot shirk this duty. The imposition of some restrictions upon the university and its professors as regards the training of students for functions in society is both necessary and justified.

Although the Dutch Government desires to respect the fundamentally independent character of the university as far as possible, it is bound to demand guarantees at least with regard to final examinations, in particular those conferring official recognition of professional status.

Dutch higher education differs in this respect from the system in the United Kingdom where the university confers no degree with civil effect, and there is another important difference between Dutch and British universities. All Dutch universities have equal status and no distinction is made between graduates from the various universities, nor even in the course of their studies. A student may pass an examination at one university and continue his studies at another, and a final examination at one university entitles one to take a doctor's degree in the same faculty at any of the other universities. From the Dutch point of view, the most striking feature of British and American universities is their diversity, the informal yet generally accepted differences in status between the universities. Education can be given free rein according to the Dutch view, provided the results, which can only be assessed by means of examinations, meet the standards set for university training.

The new Higher Education Act contains common provisions for both public and private universities on a number of important points such as the faculties system, admission, examinations and doctors' degrees. That is a new departure, even though these provisions, in accordance with the Constitution, are to be regarded as binding in the case of the public universities and as conditions for recognition and the granting of subsidies in the case of the private universities.

The most important regulation resulting from the Higher Education Act is the Academic Statute, in which among other things the examination requirements are laid down. Concerning the compulsory subjects, the examiners and the order in which the examinations shall be taken. A new Academic Statute has been drafted by the Minister of Education, Arts and Sciences and sent to the universities for comment. New examination programmes have not yet been incorporated in the draft Statute. These will first have to be discussed exhaustively by the different faculties within the framework of the Academic Council.

The new Statute will contain provisions concerning the institution of a propaedeutic probationary year for all branches of study. In the Netherlands admission to the academic examinations is open to any holder of the required

secondary school certificate, and the Dutch universities may not practise discrimination in granting admission to a university. This is perhaps one of the reasons why many students entering the universities and holding secondary school certificates later prove to be incapable of completing their studies. In some faculties the first examination is not held until several years of study have been completed so that it may be a very long time before a student is aware of his inaptitude for university studies. It is of importance both to society and to the individual that students should be given some indication as early as possible as to their aptitude for the faculty they have chosen. A propaedeutic examination after one year of study would thus meet an urgent need.

The new Statute will also give effect to the provision of the Higher Education Act for the holding of examinations for a bachelor's degree in addition to the present "candidate" and "doctoral" examinations. In addition, it will lay down the requirements for the grant of testimonials for scientific research carried out after the doctoral examination. The reason for these two new provisions is the ever longer duration of studies, some of which take as long as eight years. The institution of examinations for the bachelor's degree will enable students to complete their university studies after a shorter period and to take the doctoral examinations sooner if part of the research work is postponed until after these examinations.

Time will tell to what extent such bachelor's degree examinations will replace the candidate examinations, thus bringing the course of study more into line with the British system, in that studies are undertaken by stages, first for a bachelor's degree and then for a doctoral examination which is comparable with the examination for a master's degree.

The problems of the length of studies and the introduction of new short university studies and also that of the effectiveness of the training are dealt with in detail both in the report of the expansion commissions and in the ministerial memorandum on the expansion of higher education.

Since World War II particular attention has been given to the methodology and didactics of higher education, to what is termed the "guidance" of the student. The traditional system of lectures has to a great extent been replaced by a system of smaller working groups which somewhat eases the transition from the disciplined life of a secondary school to independent study at the university.

The broad basis typical of university study in the Netherlands may also partly explain why many of our studies take so long.

The study of a wide range of subjects with no specialization until studies are begun for the doctoral examination is intended to make graduates versatile and to fit them for a wide choice of occupations. The emphasis is entirely on learning to think scientifically and on learning how to tackle a subject scientifically. Partly for that reason efforts are being intensified, particularly at the technological universities, to include some of the humanities so as to avoid one-sided development and help the student to grow as a "human" being in the fullest sense of the word.

The special grants made available by the new Act to students who have passed their candidate examination and are evidently gifted may have an important effect on the future of higher education. These grants are intended to encourage graduates to sit for research examinations after the doctoral examinations.

Internal organization

In giving the faculties a firm legal basis, and prescribing their organization and their duties, the Higher Education Act introduced an important reform.

Under the provisions of the new Act the management of the university is conducted by a Board of Curators and the Senate, assisted by the faculties. The Boards of Curators, appointed by the Crown in the case of the State universities, are responsible for all accommodation questions and for the financial administration and control of both movable and immovable assets. They are responsible for seeing that the Higher Education Act and the regulations made under that Act are observed. The Senate's main duty is to safeguard the general interests of education and research.

The conduct of daily affairs is entrusted to a committee of which the Rector and a curator appointed by the Board of Curators are members. The secretary of the university, who holds a most important position in the system, attends the meetings of that committee and of the Board of Curators and has an advisory vote. The daily business falling within the scope of the Senate is conducted by the "Rector and Assessors".

The Act is explicit on matters concerning internal organization and the promotion of co-operation between the various university bodies. The granting of independence to universities is not justified unless the various university bodies are given wider powers and consultation between them is better regulated, both horizontally and vertically. The Act offers numerous alternative ways of achieving this, and each institution is free to elaborate its own method, and make its own regulations to this end.

Comparison of the old and the new Acts shows that a much stronger position is given to the faculty under the new Act. The faculties assist in drafting the development plan, the financial plan and the budget; they make proposals to the Board of Curators concerning the appointment of staff and advise the Board in certain cases on expenditure for material equipment for education and research. But the most important feature of the Act is the responsibility it gives to the faculty for the proper organization and effectiveness of

education. In order to fulfil this task the faculty must be willing to pursue a policy of its own and accept the principle of collective responsibility with all its consequences.

One factor that has hitherto prevented the university from taking the fullest advantage of its freedom is the system under which each member of the Senate is completely independent. But the scope of the Senate's responsibility is too large for this individual approach, whereas the scope of a single faculty is sufficiently limited to be surveyed by any of its members. The faculty as such is now jointly responsible for the organization of tuition and research in its special field. The Act places the members of the faculty, led by the chairman of the faculty (Dean), under the obligation of arranging for properly organized tuition. They draw up a programme, stating the optimum length of study which should precede the examination and supervise the carrying out of the programme. All this entails much more than merely devising a series of university lectures. This principle of collective responsibility departs from the principle hitherto frequently applied, that each member should use his own judgement in carrying out his duties. It is no longer in doubt who has the authority; it is vested in the chairman, who in future will be elected for a four-year period.

Perhaps the delegation of collective responsibility to faculties and sub-faculties constitutes the new Act's most fundamental change in policy. The universities, however, have a traditional, and therefore to a certain extent understandable, aversion to this collective responsibility.

Priorities are rarely determined jointly. Nevertheless, co-operation in which individual values are respected is possible. The reforms that are envisaged will require action by the universities themselves, particularly by the faculties. It is evident that some resistance on the part of individual members of the faculty will have to be overcome in implementing this reorganization, but the Dutch universities with their strong tradition of freedom and adaptability will surely meet the challenge.

CHAPTER IV

CONCLUSION

The world in general and the world of science and education in particular, are in a continuous process of change. Scientific discoveries are being made at an ever-increasing rate and research is becoming more and more exacting. Every programme of study calls for regular revision. Students are demanding more and more attention both inside and outside the framework of tuition owing to the sheer weight of their numbers and their diverse backgrounds. Scientific staffs are growing bigger and their functions are becoming ever more involved. Society must master the applications of the newly acquired knowledge quickly if it is to continue to exist and it therefore constantly appeals to the universities. The nation's demand for university graduates continues to grow and developing social consciousness at all levels of the population stimulates the movement towards the halls of knowledge and the higher professions. Obviously the Government, to whom education is of incessant concern, cannot adopt a dilatory policy towards this development, for greater foresight is expected of the Government than ever before. The Netherlands Government is fully aware of this and pursues a positive policy in accordance with a well-considered long-term plan for the expansion of higher education, based on a thorough preliminary study of all the relevant aspects. It is also aware that future developments will necessitate continuous adjustments.

The Netherlands Government hopes in this way to provide the ever-increasing number of students with the best possible opportunities to develop their personalities and, at the same time, to direct the Dutch potential of intellect and skill towards the service of economic progress. Educational standards will have to be raised steadily if the Netherlands is to hold its own in the international struggle for existence and the right to education will have to become a reality at a rate parallel to that of economic development.

This by no means implies that science and education should be made subservient to economic policy. Science is not solely concerned with the material benefits and power that it bestows. Man cannot live by bread alone. Science is driven by the inquisitive mind of Man who wants to understand himself in his relation to the highest values in life which will unite him, he hopes, with his fellow man and with the world in which he lives.

It is in that spirit that education must help to mould the students who will eventually fill positions of responsibility in the community. It must widen their spiritual horizons, for only then can their specific knowledge and abilities function to the best effect and stimulate a sense of human responsibility.

Within this framework, the influence of government concern for higher education and science is limited. A democratic government will base its concern for education and science on the freedom and individual responsibility of citizens. Authorities can do no more than provide the opportunities. This is done by indicating the broad outlines along which they consider that future developments can best take place, and by providing the means towards that end.

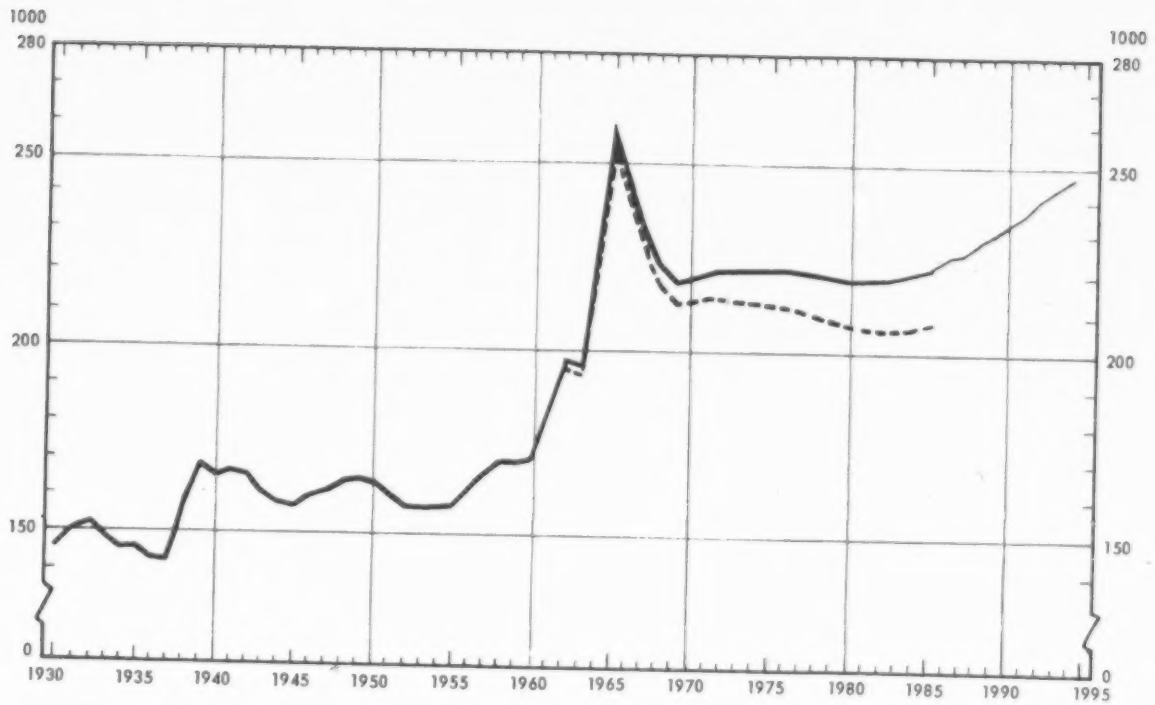
NB. Several passages of this survey have been copied from official document and other publications, e.g. de Schets van her Nederlandse Schoolwezen by Prof. Dr. Ph. J. Idenburg, (1960).

ANNEXES

1. Growth of the average generations of 18 and 19 year-olds, 1930-1995 (as at 31 December).
2. Increase in the number of graduates, 1900-1980.
3. Increase in the number of students 1900-1975.
4. Average distribution of first-year students among various faculties (in percentages).
5. Comparative table for the academic years 1955/6 and 1961/2,No. of students per university.
6. Comparative table for the academic years 1955/6 and 1961/2,No. of students per faculty.
7. Operating costs of and investments in the universities in the years 1948-1962.
8. Comparative table of operating costs of and investments in the universities in the years 1956 and 1962.

ANNEX 1

Growth of the average generations of 18 and 19 year-olds, 1930-1995 (as at 31 December).



without emigration

with emigration

ANNEX 2

Increase in the number of graduates, 1900-1980, in absolute figures and per 10 000 of the population

	1900		1930		1955		1970(a)		1980(a)	
	abs.	per 10 000	abs.	per 10 000	abs.	per 10 000	abs.	per 10 000	abs.	per 10 000
Arts	350	1	1 450	2	3 080	3	5 630	4	6 130	4
Theology	2 100	4	2 250	3	4 000	4	4 690	4	5 730	4
Law	3 200	6	4 240	5	9 480	9	12 400	10	14 250	10
Economics	-	-	230	0	3 500	3	7 600	6	11 150	2
Social sciences	-	-	50	-	570	0	1 800	1	2 950	2
Psychology	-	-	-	-	250	0	1 370	1	2 240	2
Medicine	2 480	5	4 760	6	10 200	9	13 790	11	15 970	12
Dentistry	170	0	800	1	2 160	2	4 050	3	5 540	4
Veterinary medicine	310	1	670	1	990	1	1 230	1	1 390	1
Natural sciences	1 000	2	2 150	3	4 160	4	9 150	7	13 660	10
Technical sciences	700	1	4 530	6	7 630	7	14 850	12	21 950	16
Agriculture	40	0	350	0	1 800	2	2 520	2	3 730	3
Total	10 350	20	21 420	27	47 820	44	79 080	62	104 690	76

(a) Estimated requirements.

ANNEX 3

Increase in the number of students 1900-1975

	1900	1938	1955	1965		1975	
				Estimated		Estimated	
				Supply	Demand	Supply	Demand
Arts	186	1 063	2 972	6 860	2 580	8 610	3 010
Theology	445	829	1 092	1 290	1 290 •	1 530	1 530 •
Law	551	1 434	2 551	3 200	5 090	3 880	6 110
Economics	-	1 081	3 141	5 530	6 450	6 730	7 800
Social sciences	-	-	1 502	3 600	1 750	4 470	2 055
Psychology	-	-	1 117	2 310	1 320	2 900	1 590
Medicine	1 315	3 334	5 595	7 340	5 290	9 410	6 510
Dentistry	-	385	672	990	2 120	2 210	2 570
Veterinary medicine	68	124	477	680	340	830	390
Natural sciences	439	1 697	4 477	8 930	8 600	11 290	10 735
Technical sciences	716	1 911	5 025	11 070	12 880	13 520	15 610
Agriculture	55	462	776	1 630	1 630 •	1 990	1 990 •
Total	3 775	12 220	29 397	53 430	49 340	66 370	59 900

•In the absence of any data it is assumed that in theology and agriculture the demand will be fully met by the supply.

ANNEX 4

Average distribution of first-year students among various faculties (in percentage)

	1955/1957[1]	1958/1962[2]	1963/1967[2]	1968/1972[2]
Arts	13	9	6	4
Theology	3	3	3	3
Law	8	12	10	10
Economics	11	13	14	14
Social sciences	6	3	4	4
Psychology	4	3	3	10
Medicine	12	11	10	10
Dentistry	2	4	4	4
Veterinary medicine	1	1	1	1
Natural sciences	15	15	16	17
Technical sciences	22	23	25	26
Agriculture	3	3	4	4
Total	100	100	100	100

1, Actual figures
2. Estimated requirements

ANNEX 5

Comparative table for the academic years 1955/56 and 1961/62
No. of students per university

	First-year students				Total number of students			
	1955/56		1961/62		1955/56		1961/62	
	Absolute	Index	Absolute	Index	Absolute	Index	Absolute	Index
State University at Leyden	624	100	919	147	4 266	100	5 731	134
State University at Groningen	313	100	723	231	2 248	100	3 732	166
State University at Utrecht	806	100	1 419	176	5 067	100	7 192	142
Municipal University at Amsterdam	811	100	1 134	140	6 320	100	7 430	118
Free (Calvinistic) University at Amsterdam	399	100	566	142	2 096	100	3 330	159
Catholic University at Nijmegen	435	100	769	177	1 737	100	3 371	194
State Technological University at Delft	957	100	1 269	133	5 025	100	7 176	143
State Technological University at Eindhoven	-	-	429	-	-	-	1 342	-
Netherlands Institute of Economics at Rotterdam	230	100	429	187	1 245	100	2 124	171
Roman Catholic Institute at Tilburg	100	100	220	220	617	100	1 023	166
Agricultural University at Wageningen	165	100	248	150	776	100	1 219	157
Total	4 840	100	8 125	168	29 397	100	43 669	149

ANNEX 6

Comparative table for the academic years 1955/56 and 1961/62
No. of students per faculty

	First-year students				Total number of students			
	1955/56		1961/62		1955/56		1961/62	
	Absolute	Index	Absolute	Index	Absolute	Index	Absolute	Index
Arts	622	100	1 081	163	2 972	100	6 165	207
Theology	141	100	133	94	1 092	100	971	89
Law	341	100	662	195	2 551	100	3 390	133
Economics	506	100	934	185	3 141	100	4 691	149
Social sciences	330	100	525	160	1 502	100	3 003	200
Psychology	213	100	277	130	1 117	100	1 698	152
Medicine	625	100	876	140	5 595	100	5 564	99
Dentistry	95	100	203	214	672	100	939	140
Veterinary medicine	71	100	115	162	477	100	501	105
Natural sciences	734	100	1 373	187	4 477	100	7 058	158
Technical sciences	957	100	1 698	177	5 025	100	8 518	170
Agriculture	165	100	248	150	776	100	1 191	152
Total	4 840	100	8 125	168	29 397	100	43 669	149

ANNEX 7

Operating costs of and investments in the universities in the years 1948 - 1962[1]

(multiples of f 1 million; f 1.- = $ 0.28)

Year	Operating costs[2]	Investments[3]	Year	Operating costs[2]	Investments[3]
1948	17 964	1 751	1956	62 931	24 180
1949	21 614	3 468	1957	77 766	38 934
1950	26 701	3 997	1958	96 193	56 016
1951	30 487	4 705	1959	108 722	69 490
1952	30 911	8 612	1960	125 865	96 800
1953	37 107	13 545	1961	167 809	137 500
1954	43 650	17 905	1962	196 183	151 104
1955	52 349	21 962			

1. Excluding the Agricultural University at Wageningen; investments for Municipal University at Amsterdam since 1958 only; operating for costs Municipal University at Amsterdam since 1961 only.
2. Excluding the academic hospitals.
3. Including the academic hospitals.

ANNEX 8

Comparative table of operating costs of and investments in the universities in the years 1956 and 1962[1]

(multiples of f 1 million; f 1.- = $ 0.28)

	Operating costs[2]				Investments[3]			
	1956		1962		1956		1962	
	Absolute	Index	Absolute	Index	Absolute	Index	Absolute	Index
State University at Leyden	12 465	100	29 080	232	3 397	100	17 500	515
State University at Groningen	8 000	100	18 050	226	2 758	100	10 700	388
State University at Utrecht	15 686	100	34 606	221	4 516	100	16 604	368
Municipal University at Amsterdam	-	-	26 691	-	-	-	21 000	-
Free (Calvinistic) University at Amsterdam	3 069	100	9 550	311	1 953	100	10 000	512
Catholic University at Nijmegen	4 616	100	17 450	387	4 463	100	18 500	415
State Technological University at Delft	17 668	100	39 486	244	6 542	100	25 800	394
State Technological University at Eindhoven	197	-	17 595	-	551	-	23 000	-
State Technological University at Enschede	-	-	675	-	-	-	2 500	-
Netherlands Institute of Economics at Rotterdam	678	100	1 850	273	-	-	2 500	-
Roman Catholic Institute of Economics at Tilburg	452	100	1 150	254	-	-	3 000	-
Total	62 831	100	196 183	312	24 180	100	151 104	625

1. Excluding the Agricultural University at Wageningen.
2. Excluding the academic hospitals.
3. Including the academic hospitals.

PART THREE

HIGHER EDUCATION IN POLAND

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CHAPTER ONE

INTRODUCTION

Poland may well be proud of the considerable progress it has made, since the Second World War, in the field of higher education. The number of institutions of higher education in Poland increased from 27 in the academic year 1938-1939, to 76 in 1960-1961. The number of students increased proportionately: more than 170,000 in 1961 as compared with approximately 50,000 in 1938. This increase is even more appreciable when the number of students per 10,000 inhabitants is considered: 14.4 in 1938 and 56.6 in 1961. The number of faculties and departments has increased accordingly: at present, there are more than 300 faculties, 99 correspondence courses and almost 2,500 departments. After the war, between 1946 and 1961, approximately 270,000 graduates completed their higher studies, as compared with only 85,000 between 1918 and 1939. This increase was accompanied by profound qualitative changes and particularly by the democratization of higher education. It may be said, very briefly, that this democratization is reflected in the enlargement of the network of higher educational establishments and in the wide opportunities for higher education available to the children of workers and peasants after the completion of their secondary schooling, and also to workers, as the activities of higher educational establishments and the needs of the country and of the population are more and more closely co-ordinated.

This undoubtedly represents an enormous advance, particularly for a country in which the war wiped out nearly 42 per cent of the national resources and the Nazi occupiers systematically destroyed all cultural property. The country has been able, however, to carry out large-scale industrialization and expand its system of general secondary schools and technical schools as the indispensable basis for higher education.

What were the circumstances in which such progress was achieved? Are these advances the result of the spontaneous development of powerful forces or of planning? Linked up with the development of the country's productive forces and with its culture, they were rendered possible only by the changes brought about in Poland as a sequel to the Second World War.

As in other countries, higher education in Poland was, and still is, closely related to the circumstances of the country's history. The history of the development of public education and of school systems shows that every State organizes its educational system with a view to preparing the citizen to work and live in given social and political conditions. Thus, in order to understand the essence, content and place of higher education in Poland, it is necessary to have a true and accurate idea of its function, which is determined by the trends and aims of State policy.

This function was defined in Article 1 of the Law on Higher Educational Establishments of 5 November 1958 (Official Gazette, No.68). This article states that higher education shall play an active part in the establishment and consolidation of socialism in the Polish People's Republic by:

carrying out creative scientific research;
training scientific workers and preparing them for research and teaching;
training highly qualified scientific personnel;
developing the national culture and promoting technical progress.

The object is to make higher education an integral part of the life of the country and to associate it with all national activities. However, no radical change has been made in the actual organization of higher education in Poland. Only its aims, scope and place in the country's economy have changed. Higher education is provided in State establishments, but there are two schools, financed by the State, whose programme of activities forms part of a much bigger programme applied on a nation-wide scale.

As is well known, the Polish economy is a planned economy, involving definition of the aims of economic activity and the means of achieving them. Programmes are ratified by the competent bodies (National Economic Planning Service, Diet or Government) and provide directives for the executive agencies. At the higher level, the following plans are prepared: (a) advance long-term plans; (b) national economic plans for several years ahead; (c) annual national economic plans. Each national plan comprises the plans of the different ministerial departments and there is an economic plan for higher education forming part of the national plan. Such a plan specifies not only the tasks of higher education, but also the resources needed for carrying them out: building of new schools, students' hostels, percentage of students to be awarded scholarships and other forms of assistance, building of living accommodation for scientific workers, equipping of schools and laboratories with the necessary scientific apparatus, etc. It would, however, be over-simplifying matters to

conclude that higher education is governed solely by economic directives and that the higher education plan is simply an economic plan; for the activities of a higher educational establishment are essentially complex. The idea of planning as applied to higher education is therefore much more comprehensive than the idea of planning as applied to economic activity.

The higher education plan is essentially a broad overall plan comprising a whole series of individual plans. For instance, the national economic plan includes a directive concerning the training, within a given time, of a specified number of graduates in various specialized fields corresponding to the tasks to be undertaken by the national economy. While, however, this aim is set before those in charge of higher education and the schools themselves, account also has to be taken of other factors concerning young people before their admission to higher educational establishments, during their studies at such establishments and later on when they are in employment. The higher educational authorities would be guilty of an unpardonable error if thinking solely of the number of specialists needed by the country, they were interested only in quantitative results. In fact, they are equally concerned with giving graduates the best possible training combined with the best possible education, making them not only specialists but also citizens, broad-minded men conscious of their tasks and social responsibilities in their particular field of work. Whether he is destined to become a teacher or a production manager in an industrial establishment, an agriculturist or a builder, the future graduate must always possess, besides the knowledge which is the stock in trade for his chosen profession, high moral and intellectual qualities, and a certain prestige which can come only from his value as a man and a citizen. One more general remark is necessary: if planning in higher education is taken to mean a body of directives concerning the achievement of specified aims, the "directives" can in no case be identified with "orders" from the higher authorities. The university is an institution with specific characteristics, which has taken shape through the centuries and has its own traditions, its own style and its own methods of work. In this case, "directives" must be understood to denote a series of recommendations drawn up in conjunction with the higher educational establishments. This is the only procedure likely to be effective and to achieve the ends in view. This collaboration between academic circles and the Department of Higher Education is ensured by the Law on Higher Educational Establishments. Independently of this legal guarantee, the whole practice of higher education during recent years shows that the important problems of a higher educational establishment - problems which constitute an element in planning - are settled after discussion with the future implementers of the plan or, in other words, in the main, with academic circles.

Lastly, higher educational planning is in a class apart, in that the "subject", as well as the "object", of this planning is man, with his personality, his passions and his intelligence. It is because of this that the discharge of tasks in higher education can never become an automatic process. Necessary changes and corrections have to be made, though they should not - at least in principle - alter the initial policy lines.

It is scarcely possible to speak of a single "plan" for higher education. Higher educational establishments pursue a variety of aims: the training of students and of new scientific personnel; many kinds of scientific research and refresher courses for staff in employment; practical studies and technical development work. It is therefore more accurate to speak of plans or, better, of the programmes of higher educational establishments.

Following these general remarks, whose practical significance will become clearer in the rest of this study, I should like to speak about planning procedure and methods, as well as the organization of higher education.

CHAPTER II

PROCEDURE AND METHODS OF PLANNING

The five-year plan for higher education (1961-1965) is now under way. At the same time, work has started in connexion with the twenty-year long-term plan (1961-1980) relating to the development of the national economy. Although not yet completed, the main lines of the plan are already known. It is expected that, during these twenty years, industrial production will increase by approximately 500 per cent, agricultural production by almost 200 per cent and the national income by about 400 per cent. The implementation of this plan will entail further changes in the country's economic and social structure. In this connexion, higher education will have an important part to play, as it will have to provide highly qualified specialists for all fields of human activity. The increased proportion of higher-grade staff needed in the total labour force is a feature of industrialization.

The need for a long-term plan for the future of higher education is obvious when it is borne in mind that the graduates who will complete their higher studies during the implementation of the plan will have to carry out the tasks involved in the development of the country's economy. The five-year economic development plans, drawn up in the ordinary way, are insufficient, as the training of specialists who have had a higher education usually takes more than five years. A longer time-span is necessary in order to prepare the requisite infrastructure (new educational buildings, new students' hostels, etc.) and staff.

It is true that reservations may be made with respect to the assessment of the needs for qualified staff, which is based on economic planning spread over several years, particularly if we bear in mind the technical changes that are taking place in our time. Nevertheless, if it be accepted that the plan for higher education is a body of directives, policy trends and forecasts which, as the plan is carried out, will have to be modified, corrected and supplemented in accordance with new needs, there can be no question that the drawing up of such a plan and the preparation of higher educational establishments for the performance of new tasks in accordance with that plan are completely justified.

Before the main work for the preparation of the higher educational plan was started, a number of investigations were carried out to give an idea of the present situation.

The statistics compiled by the Central Statistical Office and the samplings carried out in all sectors of the economy showed that, in 1960, the number of persons who had had a higher education fell short by approximately 59,000, of the target previously fixed. Estimates were then made of the increase in the numbers of such personnel wanted by 1980 for each branch of the national economy, these calculations being based on the assumptions of the long-term plan with regard to increases in industrial and agricultural production, in services and general employment, the development of technology and the increase in the productivity of labour. Several methods were used for making these calculations, such as job evaluation and systems of norms and indices. For many branches of the economy, systems of norms, devised by experts, were used, e.g.:

in agriculture, the number of specialists with formal agricultural training per farming unit, per village and per 1,000 hectares of arable land; the number of veterinarians per animal health centre and per 1,000 animals, etc.;
in forestry, the number of specialists per administrative unit and per 1,000 hectares of forest;
in primary and secondary education, the number of teachers per class;
in higher education, the number of students supervised by each research director or assistant;
in the health service, the ratio of staff numbers to size of population.
in some branches of industry, indices were relied on, i.e. it was accepted as a principle that the rate of increase of personnel with university level training should be faster than that of general employment, slower than the rate of increase of production, and approximating that of work productivity;
for scientific institutes and other research establishments, the principle adopted was that the number of workers ought to double in ten years.

To secure an accurate idea of the needs for graduates of higher educational establishments, the considerations to be taken into account are that it will be necessary (a) to increase the number of posts; (b) to bring numbers up to strength, replacing men lacking the required qualifications; (c) to fill vacancies (due to death and retirement on reaching the age-limit, or health reasons). The requirements under (c) were calculated from the tables drawn up for the various professions and the mortality statistics. The population census revealed that the employment of women in the various professions had had some influence on the total wastage.

For teachers, etc. in higher education, the approximate wastage calculated was between 1.7 and 2.5%.

The surveys were carried out by many teams of experts set up by the Planning Commission attached to the Council of Ministers, and consisting of economists, members of the teaching staff of higher educational establishments, statisticians, demographers, etc. Their operations made it possible to give the Ministry of Higher Education an indication of the requirements for higher-grade staff up to 1980; these can be summarized as necessitating the training of three times as many graduates as can now be turned out by establishments of higher education.

Many countries need to increase the number of trained higher-grade staff and the data relating to staffing requirements show a degree of regularity.

CHAPTER III

THE FUTURE ORGANIZATION OF HIGHER EDUCATION

The target figures thus worked out were submitted for detailed analysis to the Ministry of Higher Education, which thereupon started preparing a plan for the expansion of higher education for the period up to 1980.

Taking the view that the considerations governing the planning of higher education do not relate solely to the national economy, the Ministry of Higher Education has set up teams to investigate, from all angles, the various problems posed and to make recommendations in the light of their findings. These pointers are calculated to help the higher educational establishments in both the quantitative and qualitative attainment of their objectives.

The teams consist of persons directly involved in, and responsible for, the work of the higher educational establishments - from faculty members and administrators down to representatives of students' organizations.

While the plan is still in course of preparation, a certain number of questions and general ideas have already been pin-pointed.

If the problem of the increasing tasks falling on higher educational establishments is to be solved, we have to begin by recognizing that no great change can be brought about in the next few years. The fact is that the number of students admitted has been constant for some years past. Clearly, therefore, no quantitative increase can occur instantaneously. Further, there is little possibility of increasing the numbers of first-year students, since the intake and output of the existing establishments are limited by their accommodation and the number of teachers. Hence the urgent tasks are: (a) to expand the existing establishments and build new ones; (b) to construct study and living accommodation for students; (c) to provide for the training of university staff in sufficient numbers for teaching and research.

We can thus expect some quantitative improvement in higher educational establishments in the final years of the 1966-1970 five-year plan, but in absolute figures the appreciable increase in numbers of students, and hence of graduates, will take place between 1971 and 1980.

Once the number of graduates to be reached was known, an estimation of the total number of students became practicable. Here a very important question arises, namely the outcome of the higher educational establishments' work. In other words, we need to know the number of students to be dealt with in each year, from the first to the year of graduation, to secure the desired number of graduates, and the Ministry of Higher Education has undertaken an analysis of this for each year of each degree course. There is no doubt that the chief of the problems raised by the considerable increase in the requirements for university-trained personnel is that of the yield from education. Achieving, if possible, a high percentage of graduations within the set periods ensures a speedier rise in the number of specialists for the national economy. Considering the question of retardation and wastage solely in terms of the expense is too narrow an approach; it has another aspect which is at least as important, namely its educational and hence social implications. It would unquestionably be useful to undertake investigations, even on an international scale, of the expenditure and social consequences attributable to irregular and delayed studies. The Ministry of Higher Education has fairly precise and systematically compiled statistics which show that, although an improvement has been noted of late years, achievement and assiduity are still not satisfactory, with the highest percentage of failures occurring in the first year. For the purpose of gaining a more accurate idea of the phenomenon, the authorities looked further than the statistics, and the "Higher Education Research Centre" of the Ministry (under the charge of a well-known sociologist, Professor Jan Szczepanski), conducted surveys among first-year students, from which it emerges that, among the initial difficulties, must be included a number connected with the change of atmosphere on leaving secondary school. Among the students questioned, 42.8% considered that the greatest difficulty at the beginning of their university course lay in the impossibility of contact with their teachers. The majority found their main difficulty in organizing their studies systematically, in the lack of "teaching", in their own educational deficiences or, finally, in lack of interest. Taking on too much and time-wasting are obstacles to study for over 30% of students. Of those surveyed, 23.7% studied regularly, 17.3% studied only before the examinations, and about 50% studied from time to time, with a burst before examinations. It would be over-simplication to blame this state of affairs on the students or on the teachers exclusively. The problem is a complex one and probably arises in many countries. It is due essentially to the fact that a secondary school differs in kind from a school of higher education. For the adolescent there is an abrupt shift

from the method to which he has been accustomed in secondary school to that in use in higher education. In secondary school he had a teacher's supervision and "direction" almost daily; in the senior establishment he becomes an often anonymous unit in a large crowd and the results of his work are assessed only at examination time and at the periodical progress check-ups. Between one term and the next the adolescent becomes "adult", "independent" and unsupervised. These points are important; very often the fact of being free and independent, with new people all around him, goes to the student's head, and this is automatically accompanied by some decline in his industry.

After thorough discussions by professors at higher educational establishments and leading educationists, a scheme has been evolved to improve the situation. Its main features are as follows:

1. Stress will be laid on the "tutorial" rôle of the independent research workers in the organization of each department's teaching and on improving the actual teaching qualifications of the lecturers and associates.

2. Programmes will be recast once again and the number of lecture periods reduced so as to give more time to assignments and practical work. Priority will be given to the basic subjects.

3. Investigations will be undertaken with a view to introducing more effective university teaching methods, with special attention to increasing the interest of assignments and exercises through the use of television, radio and more science films.

4. Studies and scientific research on the teaching principles applicable in university-level schools will be undertaken.

5. The organization of instruction and study regulations will be improved to deepen the sense of discipline in their work among the young.

6. The conditions for students' personal work will be improved (a) by a better supply of university textbooks (a separate plan is being worked out for this purpose); (b) by developing the network of university libraries, faculty libraries and auxiliary libraries in student hostels.

7. Endeavours will be made to broaden the scope of students' science-club activities (by increasing grants to the clubs) and to draw in gifted students in larger numbers.

8. Special attention will be directed to first-year students. Teaching in that year will be very carefully organized so as to help students in gradually making the transition from the work habits of school to working on their own; dividing first-year students into small groups under experienced guidance and instituting a system of compulsory "tutorials" should help them to make the grade for moving on to their second year.

Obviously the successful implementation of this scheme depends on many factors, and most of all on the active co-operation of teaching staff and students. It is difficult to estimate its effects. Leaving aside the social implications, even a 2 or 3% increase in the proportion of students completing their courses as scheduled would make a substantial quantitative difference.

Another question which should be given close consideration when the long-term plan for higher education is drawn up is the basis of recruitment. In other words, accurate forecasts are needed of the number of candidates for the higher educational establishments. They consist of those who have attended general secondary schools and hold the senior secondary leaving certificate, former pupils of technical schools whose leaving certificates rank with the general senior secondary certificate, and a proportion of unsuccessful candidates from earlier years who have still not given up hope of higher education.

From careful observation of population movements by the Central Statistical Office and by demographers, and in the light of the development plans for general and technical education, it has been possible to form a clear picture of the situation, while data collected over a number of years enable an estimate to be made of the approximate percentage of all candidates sitting the entrance examination who are likely to pass. It is thus known that the number of school-leavers in any year accepted for higher education represents from 42 to 50% of the successful output from general secondary schools and about 15% of the output from technical schools (the remainder starting work in their trades). In this way it has been possible to extract the numbers of candidates for higher educational establishments for the period up to 1980, and the figures show that the steady growth of the population in Poland and, even more, the progressive extension of secondary education create the necessary conditions for a larger and larger higher education intake.

The second important factor in the basis of recruitment is assistance to young people making their choice of course, entailing the organization of what is commonly called "educational guidance". The conclusions emerging from extensive discussions on the point are that adequate arrangements for the information of the young are needed when they reach secondary school stage, and it is even argued that guidance should commence as early as possible. "Guidance and information" is provided in various forms (from what is given by secondary school teachers, or by student clubs down to information booklets of all kinds). In Poland, so-called mathematics and physics Olympiads[1] are arranged for schoolchildren and the teaching staff of higher educational establishments give series of popular science lectures.

The problem has a second facet. In Poland acceptance for higher education is conditional on passing an entrance examination which, in certain cases, is competitive. The conduct, importance and needfulness of entrance examinations are

(1) Tournaments, contests.

perennial subjects of discussion, on which there is often disagreement, and much has been published on the nature, requirements, conditions and organization of these examinations. The essential dispute is about the usefulness of entrance examinations. Most of the teaching staff of higher educational establishments believe they are necessary as not all holders of the senior secondary certificate have the qualities necessary for higher education. Others assert that these examinations are useless and argue either that they are a mere repetition of the leaving certificate examination or that they cannot constitute an adequate basis for judging a candidate's suitability for higher education. Yet another school of thought claims that entrance examinations run counter to the principle of the democratization of higher education, which should consist first and foremost in absolutely unrestricted access to it. Hence, however, we must take into account the fact that the establishments of higher education have only a limited number of places and that it is impossible to accept all those who would like to enter; and furthermore, the numbers of teaching staff remain inadequate, despite constantly rising numbers of lecture rooms and of places in laboratories, mechanical drawing studios, etc. Further, the Polish State not only bears the cost of tuition, but also provides student hostels (accommodating nearly 60% of the student body), scholarships (for more than 50% of the students), canteens, etc., and without these facilities, "unrestricted access" to higher education would, in many cases, be an empty pretence, with democratization coming down to the right to "camp in the hobo jungle". For democratization to be more than nominal, allowance must be made for all the obstacles to the pursuit of higher education, whether geographical (access to the big towns where the higher educational establishments are located) or material. Obviously, none of these arguments can lessen the feeling of frustration of those not selected, though we may hope that this feeling will disappear later on, when the sufferer is in employment, as a result of free access to evening schools and correspondence courses. As things now are, care must be taken to make the examination as objective as possible. The Ministry of Higher Education, University Senates[1], and Faculty Councils make the necessary arrangements each year to ensure that the examinations are as satisfactory as possible. Before the examinations, the examiners and secondary school teachers confer on methods, time-tables, reconciliation of the requirements of the several examining boards, etc. The Ministry of Higher Education recommends that, wherever possible, university teachers should be the examiners and, at the last, should supervise the conduct of the examination. Representatives of the school inspectorate also take part[2]. The reports on the examinations are most carefully analysed both by the Ministry of Higher Education and by the Ministry of Education and thus are of assistance in improving secondary education.

It should also be realized that the process of selecting the candidates is delicate and complex. Sustained observation and research are required and the procedures cannot be regarded as immutable.

Another question requiring discussion is that of the social structure of the student body. This has altered fundamentally in Poland in favour of the worker and peasant classes, as can be seen from the following table:

Academic Year	Class origins of students in %				
	Industrial workers	Peasants	Intellectuals	Artisans	Others
1937/38	8.9	8.0	57.5[1]		25.6
1961/62	26.3	19.0	49.2	4.6	0.9

(1) combined intellectual and artisan

Changes so radical in the social structure only became possible as a result of the political changes in Poland after the Second World War.

The wide network of secondary schools open to the children both of workers and of peasants, and the development of welfare facilities in higher education (student hostels, scholarships, canteens, medical assistance) have made such education possible, on a large scale, for people excluded, for material reasons, before the war.

Once the total numbers to be accepted for higher education had been calculated and budgets drawn up on that basis, student welfare plans were worked out, notably a scheme for expanding the groups of university residences. Between now and 1980, the Ministry of Higher Education plans to raise the percentage of students accommodated in student hostels to 70% of the total, an increase warranted by the larger numbers of students who will be coming from towns and villages at a distance from the university centres. Great efforts are also being made in the case of university canteen services. A scholarship scheme has been worked out and it is clear that, if the present proportion of grant-aided students - 55.9% - is to be maintained, the scholarship appropriations will have to be increased considerably.

An item in the general plan for higher education meriting separate treatment is the development of higher education for people in work (evening and correspondence courses). Before the war, nothing of the kind existed in Poland and the system has grown up only over the last few years. Today, the value of such studies is unquestioned and their scale is steadily growing. Experience confirms their great cultural value; and their political,

(1) Councils consisting of deans and heads of departments and institutes, under the chairmanship of the Rector.

(2) Representing the State education authorities.

social, and economic significance as factors in the modernization of industry, the organization of labour, etc., is also realized.

Evening schools may help in the setting up of cultural centres and contribute to the intellectual development of areas which have hitherto had no higher educational establishments. The students taking these courses are experienced men and women who have acquired a vast store of practical knowledge in their employment; most of them are marked by ambition and a sense of method. It is planned to set up special centres to develop new teaching methods better adapted to this kind of education.

Particular points in mind are: (1) to draw in more teachers; (2) to enlist well-known experts in the economic sphere for lecturing; (3) to step up research on teaching methods and to use radio, television, films, etc. as means of improving the courses; (4) to ensure that students are duly supplied with textbooks and guides on method; (5) to develop the workers' education network by using the universities and other existing schools of higher studies; (6) to increase the number of tutorial centres where students can get practical advice. A special convention is being drafted requiring managements to give time off and assistance to workers taking such courses.

The foregoing are the essentials of the scheme for the instruction of students in higher educational establishments. The plan is not yet in its final form and it will undoubtedly be amended or amplified in many particulars. One thing is certain: that the execution of a scheme conceived on so large a scale will have a profound influence on the economy and culture of the country.

Another plan of great importance worked out in the higher educational establishments with the help of the Ministry of Higher Education is the programme of scientific research.

In Poland, the universities and schools of higher studies, the institutes of the Polish Academy of Sciences, the industrial institutes maintained by Ministries and other research centres, central laboratories, building design departments, etc., all carry on research. Nevertheless, the major scientific potential is represented by the schools of higher education, with over 2,400 departments and nearly 16,000 research workers. The financing of research and of the scientific equipment needed for all these departments is the responsibility of the State bodies under which are the schools of higher education. The Polish Academy of Sciences collaborates in the planning, organization and co-ordination of the scientific research carried on by all Polish scientific institutions. More particularly, it submits to the Council of Ministers proposals concerning the needs of Polish science and its organization, and reports on the implementation of research plans. The first national five-year plan (1961-1965) covers 97 items of special importance for the Polish economy and Polish culture.

The plan assigns an important share of the work to the higher educational establishments, whose research activities cover 94 items, but, independently of the plan, they also carry out a second programme of their own. The national plan, designated by the symbol "P" (from the word "Panstwo"(1)), and the plan of the university departments, with the symbol "R" (from the word "Resort"(2)), are equal in importance and status. The plans of individual departments are submitted to the Faculty Councils and the Senates of the higher educational establishments, which take into consideration not simply the interest of the research projects in themselves, but also their feasibility. The plans then go to the Ministry of Higher Education, where they are evaluated by experts - distinguished research workers specially appointed for the duty by the Minister. On receipt of a favourable report on a departmental plan, the Minister incorporates it in the national plan. As will be noted, the rôle of the Ministry is to co-ordinate and finance scientific research, the former by backing up scientific institutions, ensuring the concordance of their research programmes, circulating information on the progress of the plans, eliminating obstacles, and finding means of putting the results to practical use. The Ministry organizes conferences where representatives of the departments concerned discuss problems arising in the execution of the plans and evaluate the progress of the work. Reports by individual departments are sent to the Ministry, which uses them to prepare information bulletins on the results achieved, for circulation to those concerned.

Plans can, or may have to be, amended in course of execution in respect alike of content and of time schedule.

The higher education teaching staff consists of full professors, readers or "docents", and assistant staff (assistants, senior assistants and associate professors). The research staff are aided by a large number of instructors, lecturers, librarians, engineers, technicians, laboratory staff, labourers, etc., and it is on these numbers and standard that the standard of the establishment, and hence automatically of the yield of its work, depend. Nevertheless, the docents and professors have a key rôle, and their intellectual level, creativity, experience, teaching ability, ethics, industry, and intellectual honesty are decisive factors in the quality of higher education. The leading place of science in the modern world and its links with practical affairs, the setting up of a vast network of scientific institutes and other research bodies, and the ever-growing quantitative demand for university-trained staff, have all played their part in substantially enhancing the prestige of the scientist and adding to the numbers of scientific

(1) State.

(2) Ministry - also applied to individual branches of national activity.

personnel in the developed countries. Statistics, for the period 1950-1960 show that, in the Soviet Union, the number of scientific workers rose from 162,000 to over 350,000 (Statisticeskij Sbornik, 1960). In the United States of America, in 1960, the staff of higher educational establishments numbered nearly 250,000 (N. Stanford, The American College). The studies carried out by Unesco (Current Trends in Scientific Research, by Pierre Auger, Unesco 1/61) show that, simply to maintain the present proportion of scientific personnel, an annual increase of about 3% on the absolute figures is necessary, but if we take into account the contemporary expansion of science and technology, an extra 10% must be trained every year, which means doubling the numbers every ten years. This trend, observable in all civilized societies, is also operative in Poland. However, the country's special situation, in particular the devastation it suffered during the war, and the upsurge of its economy and its culture in the post-war period, make specially energetic measures essential.

At the beginning of 1961, in accordance with the Government's recommendations, work began on the 1961-1970 overall plan for the expansion of scientific staffs. The executive agency was the Ministry of Higher Education, and attention was not confined to educational establishments but also directed to other research establishments, the institutes of the Polish Academy of Sciences, industrial institutes and central laboratories. The drafting of the plan was preceded by a succession of studies designed to identify the factors which may, to a greater or lesser degree, hamper the training of new scientific personnel. For instance, studies were made of the ages of professors and assistants, the degree of interest taken by professors in the training of young scientists, the average time required to obtain scientific degrees (Doctor's and Docent's) and the ratio of professors and assistants to students.

For planning purposes, the following classification of sciences was followed: I. Social sciences and law; II. Economics; III. Natural and exact sciences (mathematics and physics); IV. Technology; V. Agriculture and forestry; VI. Medical sciences.

The plan prepared for the period 1961-1970 deals with the following:

number of doctors' degrees;
number of docents' degrees;
numbers of teaching staff in industrial and agricultural institutes;
numbers of auxiliary staff, engineers and technicians.

For the period 1961-1965, the plan was based on the estimates of the Faculty Councils of higher educational establishments and other institutions, after cutting their figures for doctorates and docents' licences through fears of over optimism, by 25 to 30%. A different method was used for the 1965-1970 plan, for which the forecast of doctorates taken in 1964 was used to determine the number of docents in 1965-1970 on an estimated percentage basis. Obviously, the number of doctorates awarded is directly dependent on the number of candidates for the degree. The latter come mainly from the ranks of assistants and associates in schools of higher studies and other scientific institutions. Others are employees in various building-design offices and research departments and it has been noted, of recent years, that the degree attracts engineers working in industry. However, the majority of the doctors come from among the junior academic personnel, i.e. those who have chosen science as a career, and it is therefore planned to make large increases in the numbers of assistants and associates as a means of increasing the number of doctors.

The calculations showed that, by 1970, the number of doctors could be almost quadrupled, with special attention to selected fields such as the natural and exact sciences, and technology, while a whole series of expedients and measures would ensure that the average age of doctors was between 29 and 30.

The plan for the academic rank of docent, for the period 1961-1965, was prepared on the basis of the detailed proposals made by Faculty Councils, with a precautionary reduction of their estimates just as in the plan for doctorates. For the period 1965-1970, the plan has been based on the anticipated number of doctorates conferred between the present date and 1965, on the assumption that about 40% would qualify for the academic rank of docent.

In the plan worked out, there are two distinct stages, the first for the period of past and future increase in the number of doctors and the second for that in which the number of docents will increase. It may be noted that over 3,000 doctors' degrees were conferred from 1959 to 1961 alone.

These data made it possible to calculate the prospective growth in the number of research workers on the basis of: (a) present numbers and age structure (with allowance for wastage) and (b) the planned number of docents' licences among present holders of a doctor's degree or those securing one between now and 1964. A two and-a-half-fold increase in the number of research workers by 1970 is expected and concurrently, the age structure of this category should change for the better.

Finally, the numbers of junior staff were planned in the light of the following considerations:

need to create the conditions essential for recruiting prospective research workers;
expected rise in the number of students;
need to keep a proper numerical proportion between professors and assistants;
estimate of the development needs and trends in the various scientific institutions.

Numbers in this category should almost double between now and 1970.

A plan on this scale requires the application of a whole series of measures, which are specified in

the plan (judicious selection of scientific personnel, organization of their training, etc.).

Over the selection of candidates for careers in science, the choice cannot be left to the initiative of the young themselves. It is the duty of their teachers to channel them towards research after observing their abilities and their interest in the selected branch. Students' clubs - can provide an opportunity for such observation. Consideration is being given to increasing the number of scholarships for students evincing an interest in research. In 1961, an experiment was tried out in higher educational establishments which seems likely to give satisfactory results: namely, the institution of trial assistantship. Deans of faculties are authorized to select graduates for twelve-month appointments as probationers, during which period they are attached to a department to prove whether or not they are capable of becoming research workers later on. We can reasonably expect that this system will allow of efficient selection of new assistants.

Scholarships are granted by the Minister on the advice of Faculty Councils to individuals sufficiently advanced in the preparation of their doctoral theses and their work for the docent's licence, but, in view of the shortages in certain branches of learning, a special type of training, known as "doctoral studies" has been started in higher educational establishments at doctorate level. These courses are provided in those departments where the kind of staff and equipment desired are available, and are reserved for candidates who have completed scientific and professional probationerships. During their course, the candidates concentrate exclusively on scientific activities. They have grants and other material benefits but may not work for remuneration.

Mention should also be made of the periods spent by assistants in well-known scientific centres in Poland or abroad. In all cases, training must be provided by active, independent and experienced scientific personnel, and in close liaison with research activities.

One question remains - that of the formal criteria for academic employment, namely the thesis for the doctorate and the dissertation for the docent's licence. The thesis must be "a piece of personal scientific work" and the docent's dissertation must represent a "creative contribution to the advance of a branch of knowledge". Both are judged by a comple.. which originated in the universities in the teenth and early Twentieth centuries, at a time when research was mainly on fundamentals and was a one-man activity. Today, in contrast, we are faced with the emergence of group research in which a number of specialists co-operate and, further, applied research is taking its place beside basic research and becoming increasingly important. The boundaries between the sciences are growing indistinct and all the sciences are reacting increasingly on the productive forces and general culture of human societies. New links are emerging between the different branches of study: new means of research, and new forms of organization for scientific research are developing. Finally, the very development of higher education and its ties with the economy, politics and industry have modified the nature of the university's activities. Hence there is an inevitable antinomy between the kind of work the universities are doing and their structure, which took shape when conditions were completely different. It is felt that the higher educational establishments are behind the times and should be readjusted to the circumstances and needs of our day. There are also proposals for modifying the system of doctoral theses and docent's dissertations and simplifying the procedure for the award of academic degrees.

Earlier it was said that the structure of higher educational establishments had not undergone any far-reaching changes, but it must be realized that the current radical changes in their activities and the evolution in working methods now taking place are bound to call for a structure better fitted to the exigencies of our time.

CHAPTER IV

CONCLUSION

Quite apart from the matters discussed earlier, there are yet other problems confronting higher education, for independently of the education of students, schools of higher studies have the duty of providing refresher training for highly qualified staff already serving. This is a relatively recent departure, catering for ever-widening professional categories. Twenty or thirty years ago the knowledge one acquired as a student remained adequate for many years; today, it needs to be constantly brought up to date as a consequence of the rapid pace of scientific and technological progress and the need for putting new discoveries in pure science to practical use. With their staffs of scientists, the higher educational establishments are the best placed for the successful conduct of this work, which takes a variety of forms (short or long courses, specialization courses or refresher courses). With the numbers served increasing yearly, this is another sphere where planning and budgeting are needed.

Polish higher educational establishments are extremely active in the publishing field, producing not only textbooks for their students but also scientific books and monographs, home study courses and methods guides. The output of the National Office of Science Publications (PWN), which comes under the Ministry of Higher Education, runs to about 20,000 sheets of print a year. The universities, etc. also publishing scientific treatises (about 6,000 sheets of print a year), get the necessary funds for the purpose from the budget of the Ministry.

The higher educational establishments have libraries with extremely valuable book collections, which also undertake research tasks. The increasingly close links between the universities and industrial circles are reflected in the creation, in the various university departments, of special sections serving industry (preparation of projects, construction of prototypes, expert appraisals, etc.).

In the higher schools of agriculture, new methods development centres have been set up, whose object is to help agriculturalists to exploit scientific discoveries, and to work out methods for post-university training. The higher schools of agriculture run large experimental estates, not merely for training, but for productive ends.

The soundness of the work of higher education as a whole, with the vital rôle it has to play, depends on that of the estimates and forecasts, the plans made, and the way they are carried out.

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